

SUBJECT: PCB Spill - Slip I

DATE: 2-10-75

FROM: J. N. Blazevich

TO: Francis L. Nelson  
Chief, Technical Support Branch

THRU: Arnold R. Gahler

On September 13, 1974 an electric transformer destined for Arctic service was dropped and broken on the north pier of slip I on the Duwamish River. As a result transformer fluid, 1242 PCB, was discharged onto the pier and into the water. After becoming aware of the quantity and type of fluid spilled, EPA acted to determine the extent of pollution by sampling the spill area. Once determined feasible, clean-up of the fluid was started using several hand dredges and a water treatment plant consisting of settling tanks, sand and carbon filters.

Laboratory personnel set out to monitor the operation, checking various sites in the water cleaning plant, sludge removed from the river bottom, water discharged back into the Duwamish and river bottom sediments. This information was necessary to determine (1) the amount of PCB removed, (2) the amount of PCB returned by effluent discharge to the river, (3) the amount of PCBs remaining on the river bottom, and (4) the extent of migration of PCBs on the river bottom during the clean-up operation.

Attached are the results of analyses of samples taken during the PCB spill clean-up period. The data is shown according to sample type (Tables 1 - 8) along with maps of PCB concentrations in sediments near slip I.

Results of the first river sediment sampling trip conducted on 9-20-74 (figure 1) were used to demonstrate PCBs were in the area of Slip I in high concentration and that recovery should be attempted (Table 2). Note contours are used for convenience even though pockets of PCB were encountered. Results of subsequent sediment sampling trips (figures 2, 3, 4 and 5) verified the first, but pointed out PCB were somewhat mobile (Tables 3, 4 and 5). This is in agreement with observations of divers, who observed pools of PCB moving as much as 300 feet with the tide from one day to the next.

The last sediment samples, represented by the results of Table 5, (figures 4 and 5) were taken after the clean-up operation was terminated. The results show a net migration of PCBs upstream but little if any vertical movement. Another sediment sampling trip is planned in early spring to plot further movement.

Results of analysis of composite sludge removed from the river bottom and water at various points in the clean-up plant are shown in



Results of analysis of composite sludge removed from the river bottom and water at various points in the clean-up plant are shown in Tables 6, 7 and 8. Concentrations of 1242 PCB ran from 0.5 to 20.0 pp thousand in the sludge, as high as 400 ppb in the settling tank just before the sand filter, 3.5 ppb before the carbon filter, and usually less than 0.4 ppb in the water discharged back to the Duwamish. Recoveries, duplicates and blanks were run with the above mentioned samples. Recoveries were between 85 and 100% and blanks were negligible.

Results of analysis of typical sludge and sediment samples as well as PCB 1242 standard by GC/MS are shown in figures 6 through 17. Figures 6, 7 and 8 show reconstructed gas chromatograms (RGC) for the three samples. Limited mass chromatograms (figures 9, 10 and 11) with  $M^+/e=256-261$  shows patterns indicative of 1242 PCB isomers containing 3 chlorine atoms. Similar limited mass chromatograms (figures 12, 13 and 14) using  $M^+/e=290-300$  gives patterns expected for 1242 PCB isomers with 4 chlorine atoms. Corresponding mass spectra for each sample type are shown in figures 15, 16 and 17. The spectra are identical. Analysis of these spectra show molecular ion clusters typical of chlorinated biphenyls with 4 chlorine atoms along with strong P-70 clusters beginning at  $M^+/e=186$ . This is indicative of the loss of  $Cl_2$ . Comparison of above RGC's and spectra of sediment and sludge samples with those of 1242 PCB standard shows 1242 PCB to be present in both.

Based on the above results one may make the following conclusions.

1. The total amount of PCB remaining on the river bottom is estimated to be 55 gallons. (Appendix A)
2. Less than 0.1 gallons of PCB was discharged back into the Duwamish in the effluent from the carbon filters.
3. Approximately 75 gallons of PCB were removed from the river bottom and await disposal at a site to be determined. (Appendix B)
4. About one-half of the total spilled is accounted for as of today.

TABLE I

## Sample Types Analyzed

Type	Number	Total
Water	68	
Sludge	21	
Sediment	91	
Miscellaneous *	42	222

\* 4 Sediment, 6 mixing tank, 1 carbon, 2 water and 29 recovery and blank samples.

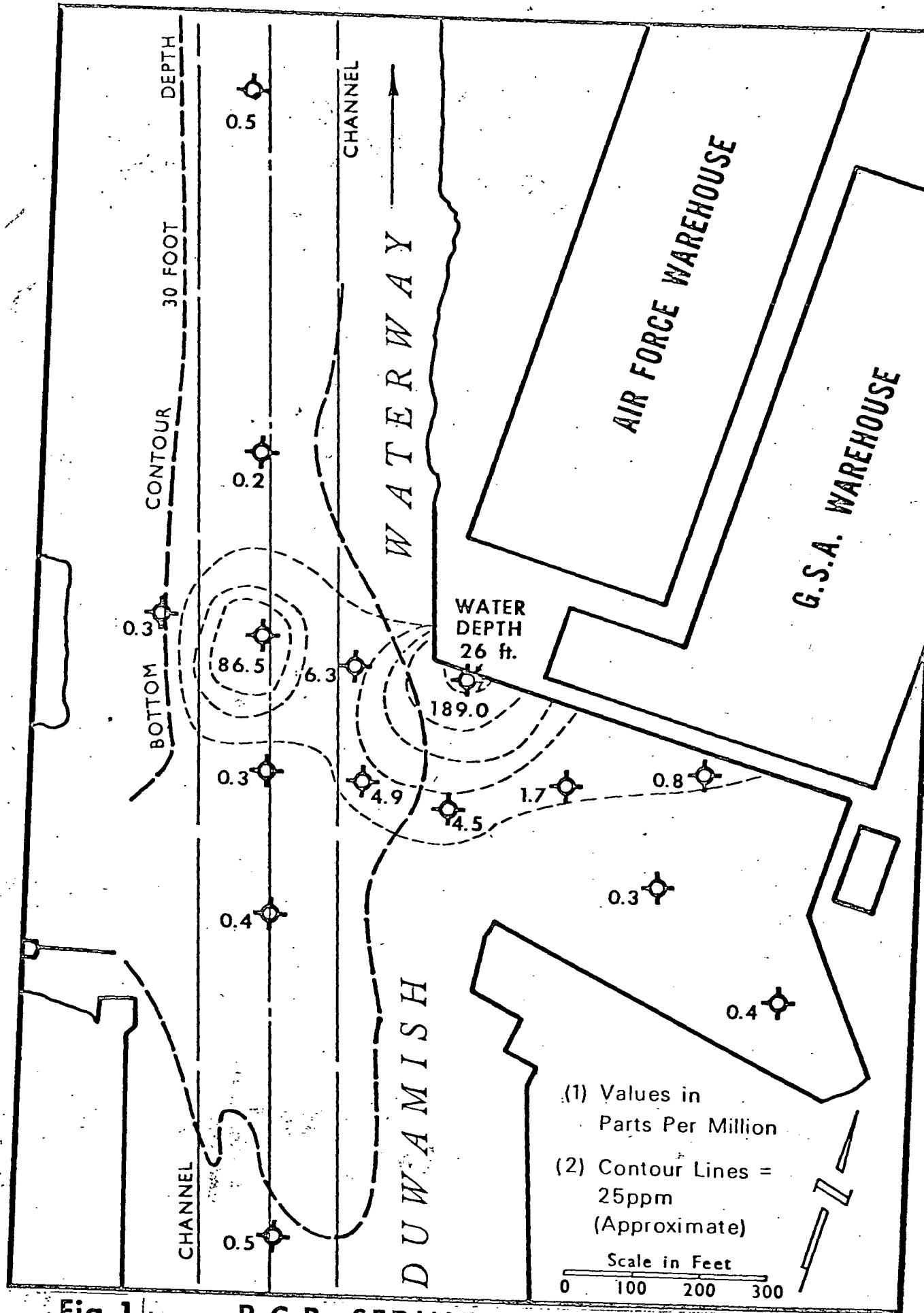


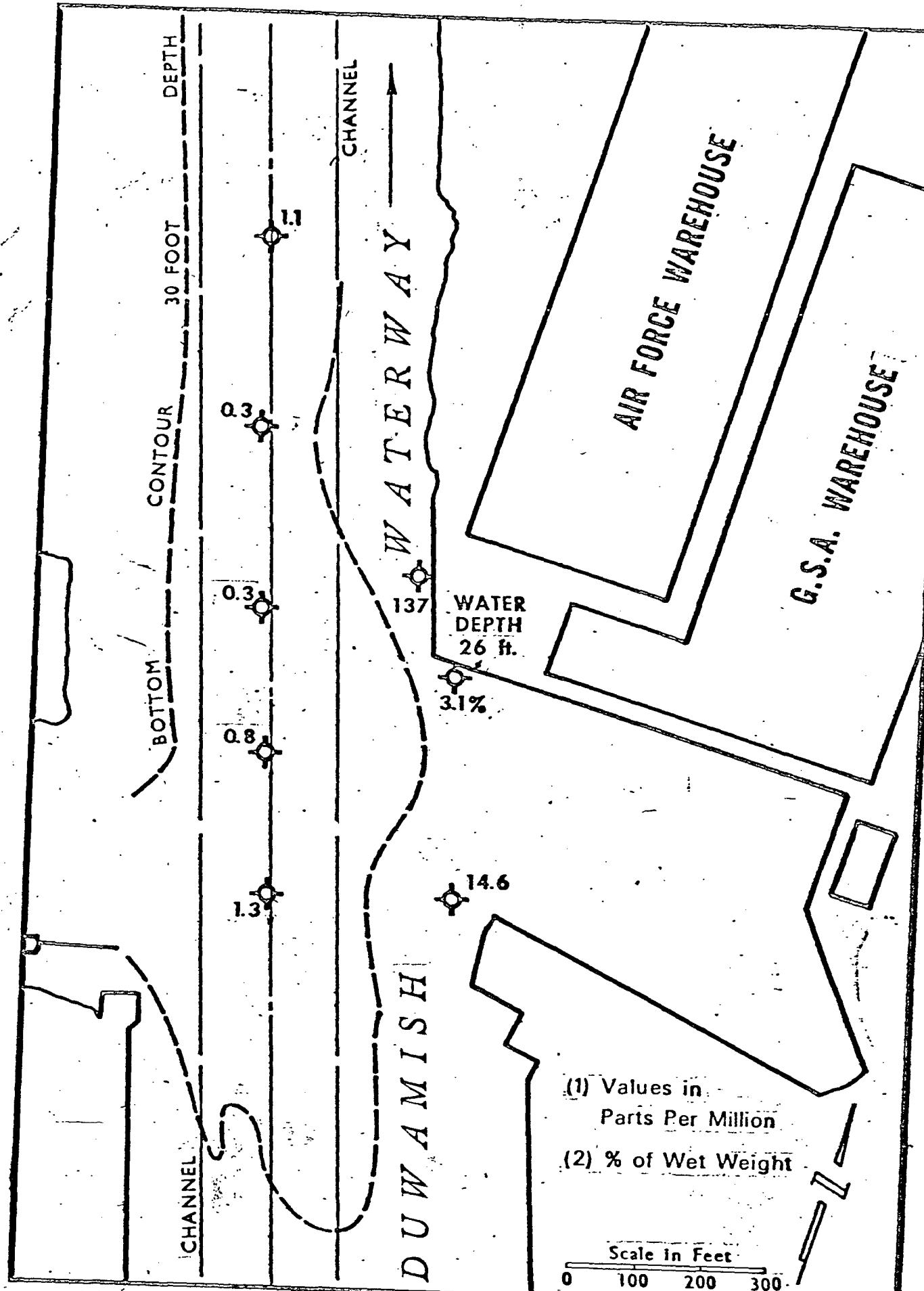
Fig. 1 P.C.B. SEDIMENT CONCENTRATION  
PRE-CLEANUP (Sept. 18, 1974)

TABLE 2

Sediments Taken From Slip 1 9-20-74

<u>Number</u>	<u>1248/54</u>	<u>ppm</u>	<u>1242</u>	<u>Number</u>	<u>1248/54</u>	<u>ppm</u>	<u>1242</u>
38201	0.192		0.334	38221		0.30	0.20
38202	-		-	38222		0.18	0.14
38203	0.34		0.24	38223		-	4.90*
38204	0.43		0.23	38224		-	4.50*
38205	0.39		0.35	38225		-	189.0 *
38206	0.09		0.06	38226		-	1.70*
38207	-		0.50*	38227		-	0.80*
38208	4.25		1.9	38228		-	0.30*
38209	0.11		0.11	38229		-	0.40*
38210	0.15		0.06				
38211	0.35		0.30				Following were duplicated
38212	-		-	38205		-	0.80*
38213	-		-	38209		-	0.40*
38214	0.40		0.20	38220		-	0.30*
38215	-		0.50*	38222		-	0.30*
38216	0.28		0.11	38226		0.42	0.06
38217	-		0.20*				
38218	-		6.25*				
38219	-		86.5 *				
38220	0.27		0.12				

\* PCB concentrations based only on Aroclor 1242



**Fig. 2 P.C.B. SEDIMENT CONCENTRATION**  
**(Sept. 25, 74)**

TABLE 3

Sediments Taken From Slip 1 9-25-75

<u>Number</u>	<u>F1248/54</u>	<u>F1242</u>
39209	0.56 ppm	1.3 ppm
39216	0.61 ppm	1.07 ppm
39217	0.25 ppm	0.25 ppm
39219	0.27 ppm	0.23 ppm
39222	0.69 ppm	0.76 ppm
39225	-	3.09%
39230	-	14.6 ppm
39231	-	137 ppm

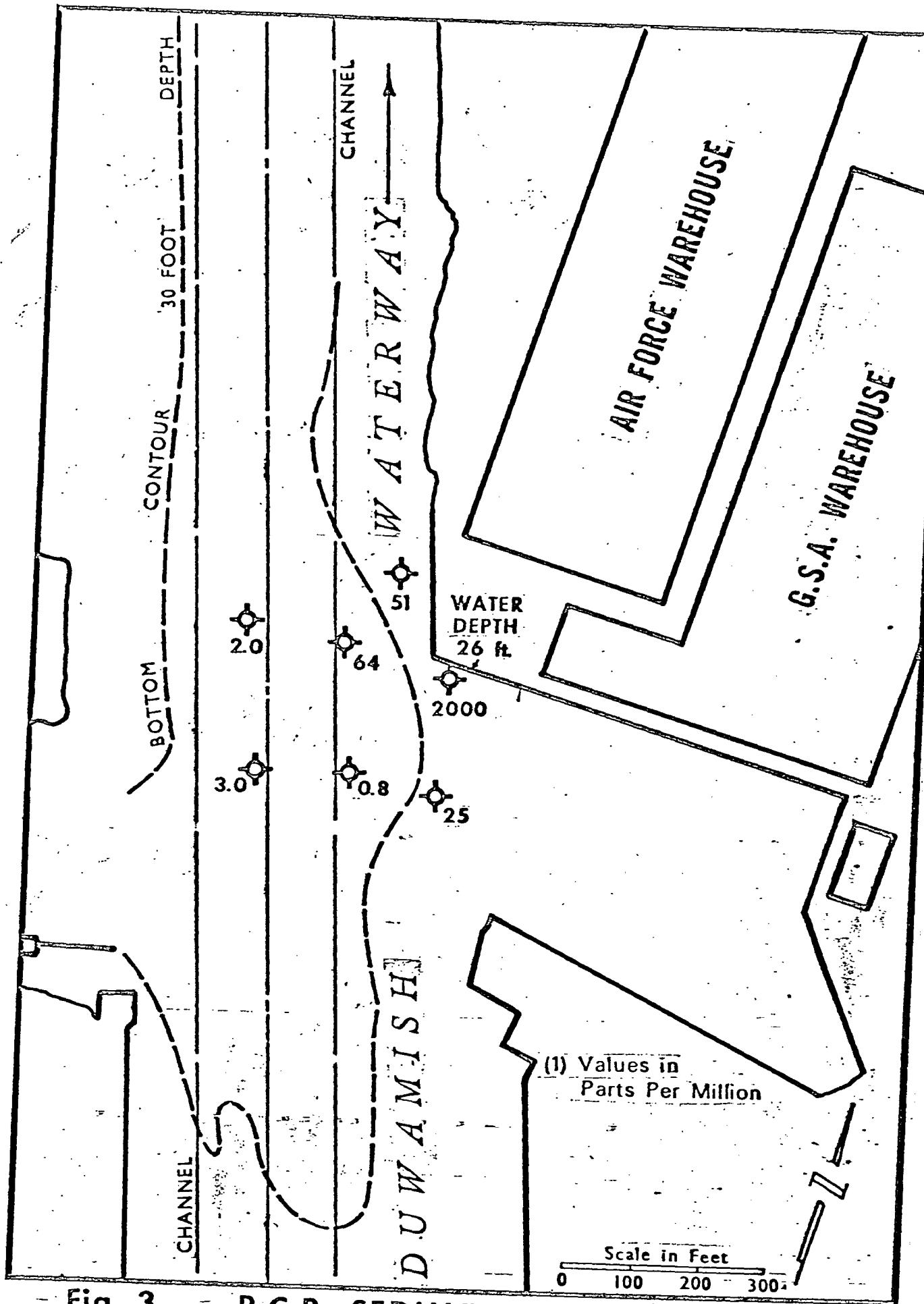


Fig. 3 P.C.B. SEDIMENT CONCENTRATION  
 (Oct. 18, 74)

TABLE 4

Sediment Taken From Slip 1 - 10-18-74

<u>Number</u>	<u>1248/54</u>	<u>1242</u>
42218	-	64 ppm
42219	-	2.04 ppm
42222	-	2.5 ppm
42223	-	0.830 ppm
42224	-	24.8 ppm
42225	-	1.9 pp thousand
42231	-	51 ppm

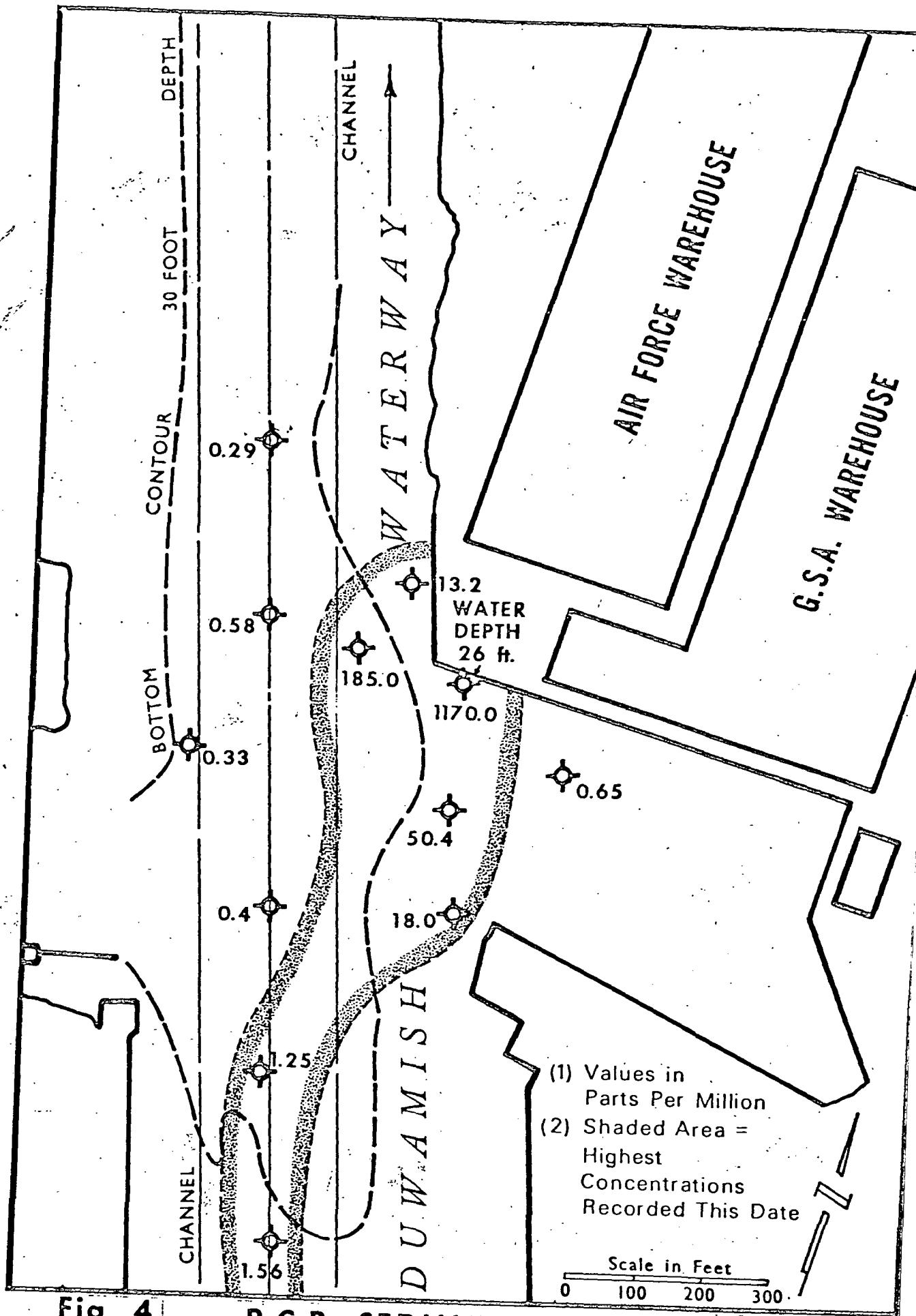


Fig. 4

P.C.B. SEDIMENT CONCENTRATION  
POST CLEANUP (Nov. 4, 1974)

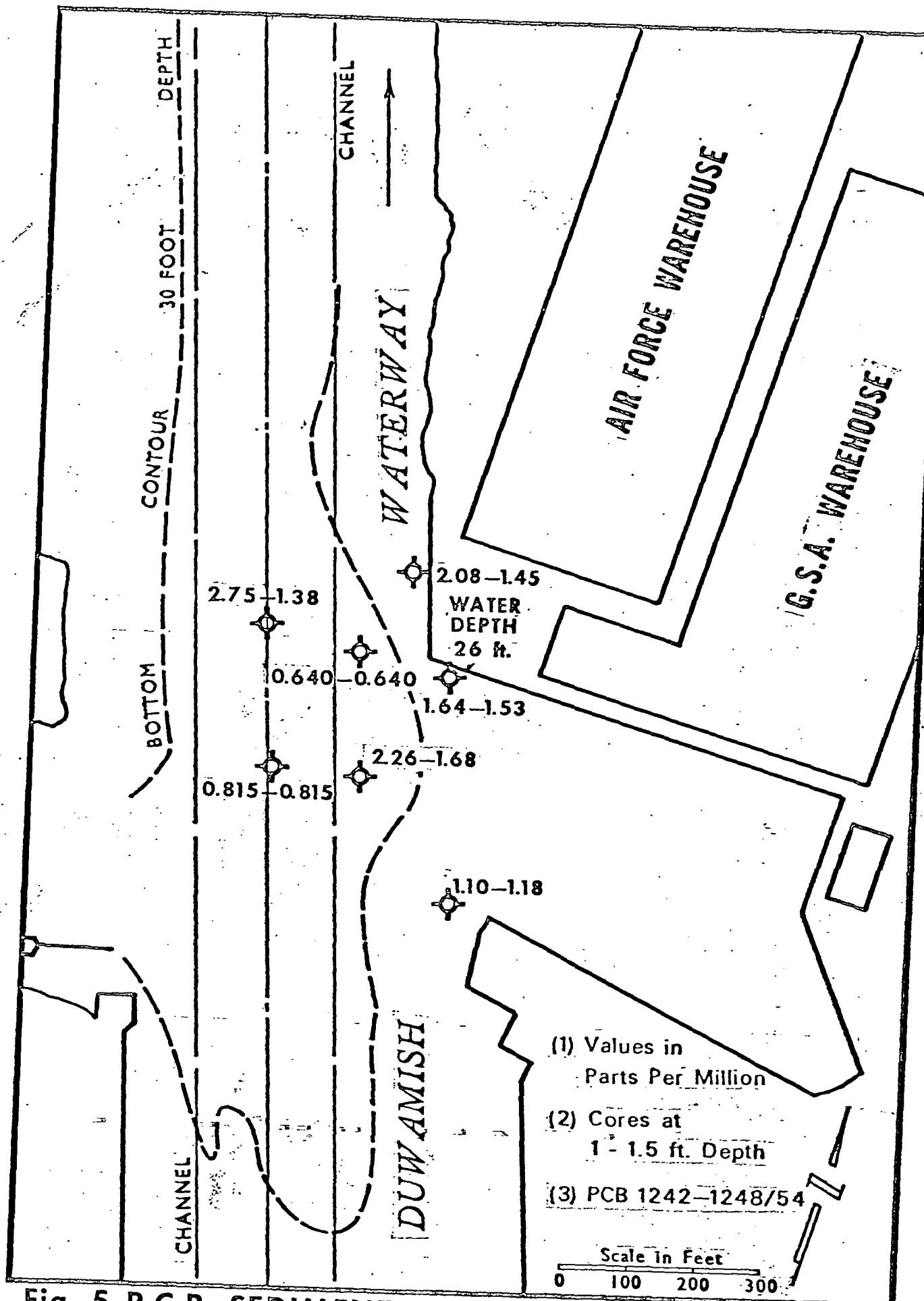


Fig. 5 P.C.B. SEDIMENT CONCENTRATION IN CORES  
 (Nov. 4, 74)

TABLE 5

Sediment Taken From Slip 1 11-4-74

Concentration PCB In ppm (wet wt.)

<u>Sample No.</u>	<u>F248/51</u>	<u>ppm</u>	<u>F242</u>	<u>Sample No.</u>	<u>F248/51</u>	<u>ppm</u>	<u>F242</u>
45201	0.25		0.69	45224	-		50.4
45202	0.32		0.41	45225	-		1170.0
45203	0.23		1.16	45226	0.12		0.70
45204	0.28		0.43	45227	0.13		0.09
45205	0.19		1.46	45228	0.20		0.16
45206	0.36		1.23	45229	0.73		0.25
45207	0.35		1.56	45230	1.23		18.1
45208	0.35		1.22	45231	-		13.2
45209	0.28		0.45	45232	0.29		0.97
45211	0.49		0.48	45233	0.15		0.36
45212	0.29		0.57	45234	1.11		0.22
45213	0.41		0.35	45235	-		0.03
45214	0.52		0.44	45236	0.34		0.28
45215	0.37		0.33				
45216	0.28		0.38	45218 core	0.64		0.64
45217	0.40		0.29	45219 core	1.38		2.75
45218	-		185.0	45222 core	0.82		0.82
45219	0.23		0.58	45223 core	1.68		2.26
45220	0.09		0.09	45225 core	1.53		1.64
45221	0.34		0.34	45230 core	1.18		1.10
45222	0.25		0.44	45231 core	2.08		1.45
45223	-		12.6	duplicated			
				45212	0.34		0.27

TABLE 6

Water - Effluent From Sand/Carbon Filter

10-13-74 To

<u>Laboratory No.</u>	<u>Site</u>	<u>Date</u>	<u>52421 in ppb</u>
42200	131330 effluent	10-13-74	0.052
42203	141015 effluent	10-14-74	0.290
42207	141635 effluent	10-14-74	0.448
42208	141435 effluent 141330 composite	10-14-74	0.649
42213	151535 effluent 151625 composite	10-15-74	0.073
42214	151405 effluent 151135 composite	10-14-74	18.0
42240	161330 effluent 161215 composite	10-16-74	0.900
42241	161210 influent	10-16-74	64.8
42242	161450 influent	1-16-74	254
42243	161450 effluent	1-16-74	0.059
42244	161330 influent	10-13-74	114.0
42245	171455 effluent 171340 composite	10-17-74	0.120
42246	170815 effluent 161640 composite	10-16-74	0.417
42247	161630 influent 170810 composite	10-16-74	330.0
42248	171450 influent 171335 composite	10-17-74	358.0

TABLE 6 con't

<u>Laboratory No.</u>	<u>Site</u>	<u>Date</u>	<u>1242</u> in ppb
42248	171450 influent 171335 composite	10-17-74	358.0
42249	180950 influent 171540 composite	10-17-74	460.0
42251	171545 effluent 180955 composite	10-17-74	0.670
42236	181400 influent 181315 composite 181125	10-18-74	575.0
42238	181325 effluent 181130 composite	10-18-74	1.760
42235	181405 effluent 181525 composite	10-18-74	1.700
42237	181520 influent 181630 composite	10-18-74	296
42239	181630 effluent	10-18-74	0.618
43290	191201 effluent	10-19-74	3.460
43291	191050 effluent 190845 composite	10-19-74	1.070
43292	191050 influent 190840 composite	10-19-74	385.0
43293	191350 effluent 191600 composite	10-19-74	0.730
43294	200820 effluent 201100 composite	10-20-74	0.232
43295	191600 influent 191350 composite	10-19-74	262.0

TABLE 6 con't

<u>Laboratory No.</u>	<u>Site</u>	<u>Date</u>	<u>[242] in ppb</u>
43296	201100 influent 200820 composite	10-20-74	0.167
43200	211120 influent 211255 composite	10-21-74	74.0
43201	201300 influent 201440 composite	10-20-74	297
43202	210900 influent 201630 composite	10-20-74	228
43203	211135 effluent 211300 composite	10-21-74	0.192
43204	201635 effluent 210905 composite	10-20-74	0.121
43205	211605 effluent 211445 composite	10-21-74	0.135
43206	211440 influent 211610 composite	10-21-74	228.0
43207	201445 effluent 201305 composite	10-20-74	0.104
43208	220400 influent 221245 composite	10-22-74	302.0
43209	221410 influent 221540 composite	10-22-74	101.0
43210	221415 effluent 221545 composite	10-22-74	0.64
43211	220855 effluent 221250 composite	10-22-74	0.41

TABLE 6 con't

<u>Laboratory No.</u>	<u>Site</u>	<u>Date</u>	<u>T<sub>1242</sub></u> in ppb
43216	231405 effluent	10-23-74	0.35
43217	231301 effluent	10-23-74	0.43
43218	231515 effluent	10-23-74	3.52
43219	231400 influent 231503 composite 231258	10-23-74	240.0
43223	241415 effluent 241320 composite 241215	10-24-74	0.20
43224	241405 influent 241320 composite 221215	10-24-74	72.0
43225	241205 influent 241025 composite 241130	10-24-74	260.0
43226	241030 effluent 241135 composite 241155	10-24-74	0.16
43227	251045 effluent 251150 composite 251120	10-25-74	0.074
43228	250950 influent 250830 composite 241600	10-25-74	48.0
43229	250955 effluent 250835 composite 241605	10-25-74	0.23
43230	251040 influent 251145 composite 251115	10-25-74	138.0
44205	261105 251550 effluent 251635 composite 260855	10-25-74	0.78

TABLE 6 con't

<u>Laboratory No.</u>	<u>Site</u>	<u>Date</u>	<u>[1242] in ppb</u>
44204	261135 261155 effluent 261325 composite 261355	10-26-74	0.76
44206	251235 251330 effluent 251405 composite	10-25-74	0.27
44207	261635 271120 effluent 261440 composite 261535	10-26-74	0.39
44209	251230 251325 influent 251400 composite	10-25-74	139.0
44210	261350 261320 influent 261150 composite 261130	10-26-74	39.0
44211	261100 251545 influent 251630 composite 260850	10-25-74	289.0
44212	261630 271115 influent 261435 composite 261530	10-26-74	-
44213	271310 271255 influent 271225 composite 271150	10-27-74	1136.0
44214	271315 271300 effluent 271230 composite 271155	10-27-74	0.89

TABLE 6 con't

<u>Laboratory No.</u>	<u>Site</u>	<u>Date</u>	<u>12427 in ppb</u>
44215	280940/281500 280840/281315 effluent 271605/281245 composite 271505/281030	10-28-74	0.48
44216	281455/280935 281310/280835 influent 281240/271600 composite 281028/271500	10-28-74	545.0
44219	301000/291235 291530/291200 influent 291420/290930 composite 291315/281500	10-29-74	645.0
44220	281505/291320 290930/291425 effluent 291205/291535 composite 291240/301005	10-29-74	0.36
42209	141345 effluent 141455 composite	10-14-74	0.207

TABLE 7

## Sludge - Composites Taken Of Drums When Filled

<u>Laboratory No.</u>	<u>Site</u>	<u>Date</u>	<u>[12]2 in pp thousand</u>
42210	151130 to 151415	10-15-74	3.18
* 42210 duplicate	151130 to 151415	10-15-74	3.63
42211	151455 to 151540	10-15-74	4.07
* 42211 duplicate	151455 to 151540	10-15-74	4.78
42212	151400 to 151425	10-15-74	3.44
* 42212 duplicate	151400 to 151425	10-15-74	3.85
42232	180935	10-18-74	20.8
42233	151545 to 161525	10-15-74	26.32
42234	161525 to 161610	10-16-74	9.46
43297	200915 to 200950	10-20-74	12.8
43298	200845 to 200910	10-20-74	12.6
43214	231000	10-23-74	18.7
43215	231045	10-23-74	21.7
44200 ---	270930	10-27-74	4.03
44201	271030	10-27-74	5.42
44202	271000	10-27-74	7.40

TABLE 7 con't.

## Sludge - Composites

44203	271100	10-27-74	8.23
44217	301030	10-30-74	18.4
45237	311050	10-31-74	7.6
45238	010900	11-01-74	2.7
45239	310930	10-31-74	7.6

TABLE 8  
Miscellaneous Samples Taken For Slip I

<u>Laboratory No.</u>	<u>Site No.</u>	<u>Date</u>	<u>Type</u>	<u>Concentration</u>
42250	180955	10-18-74	Mixing tank	80.7 pp thous.
43213	231320	10-23-74	Mixing tank	4.8 pp thous.
43220	250825	10-25-74	Mixing tank	4.3 pp thous.
42205	141015	10-14-74	Settling tank	420 ppb
42204	141015	10-14-74	Sand filter water	3.5 ppb
42202	140915	10-14-74	Mixing tank	6.9 pp thous.
42206	140915	10-28-74	Sediment at 225	223 ppm
42201	131305	10-13-74	Settling tank	222 ppb
44208	281410	10-28-74	Sediment at 225	2.0 pp thous.
43222	251450	10-25-74	Sediment under pier	13.1 ppm
43221	251445	10-25-74	Sediment at 225	1.06 pp thous.
42218	291110	10-29-74	Carbon	50 ppb
39200	39200	10- 2-74	H <sub>2</sub> O - Coagulation standing	4.7 ppb

29 Recovery and blank samples

FIGURES 6, 7 AND 8 COMBINED  
RECONSTRUCTED GAS CHROMATOGRAM

PCB 1242 STD

45225 SED. TAKEN AT POINT OF PCB SPILL - SLIP 1 -

310930 SLUDGE FROM PCB SPILL - SLIP 1 - ON 9-13-74

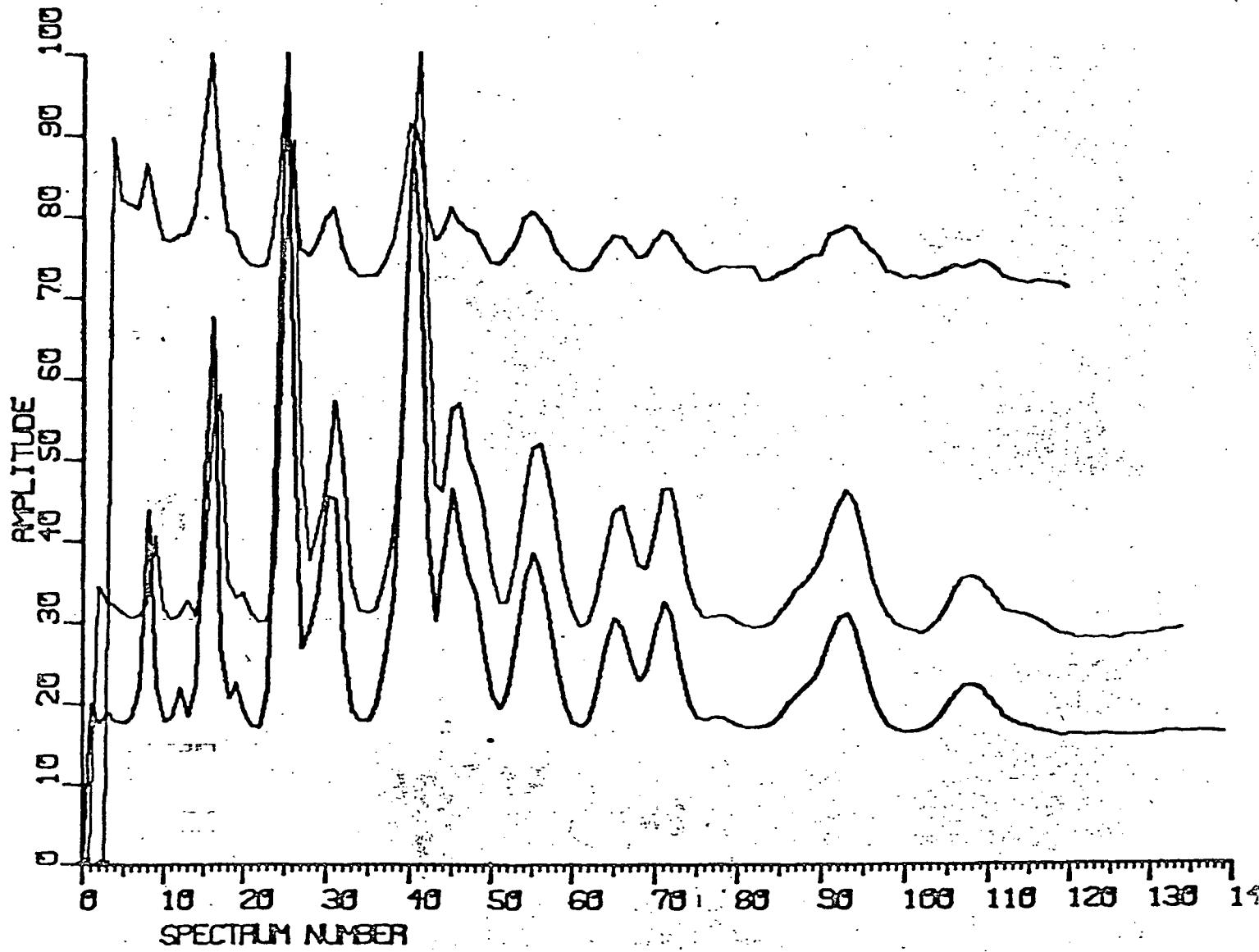


FIGURE 6

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?:  
RECONSTRUCTED GAS CHROMATOGRAM?: Y  
FILE NAME: 310930  
LIMITED MASS RANGE?:  
PRINT?:  
EXPAND BY:

310930 SLUDGE FROM PCB SPILL - SLIP 1 - ON 9-13-74

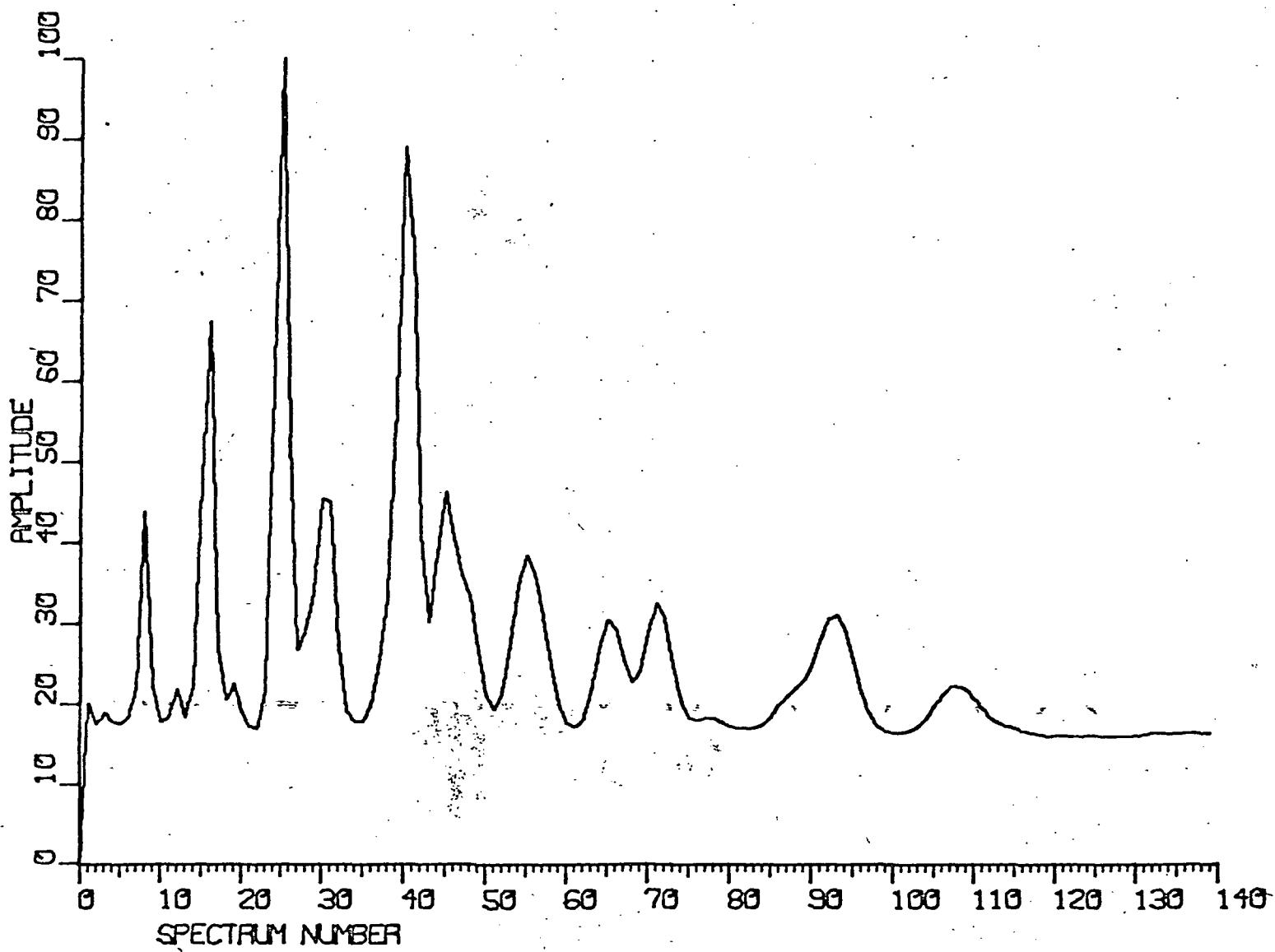


FIGURE 7

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?:  
RECONSTRUCTED GAS CHROMATOGRAM?: Y  
FILE NAME: 45225S  
LIMITED MASS RANGE?:  
PRINT?:  
EXPAND BY:

45225 SED. TAKEN AT POINT OF PCB SPILL - SLIP 1 -

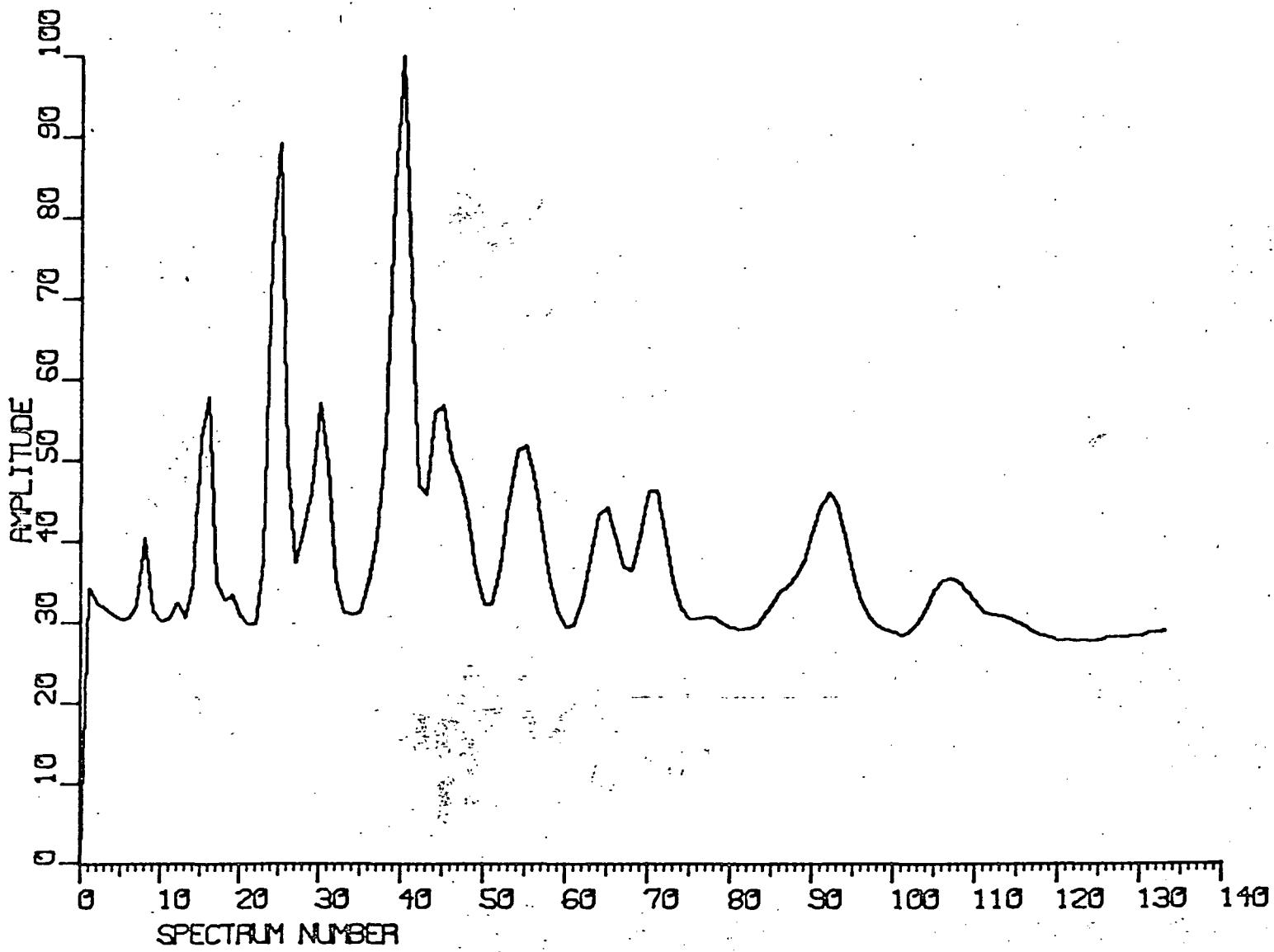
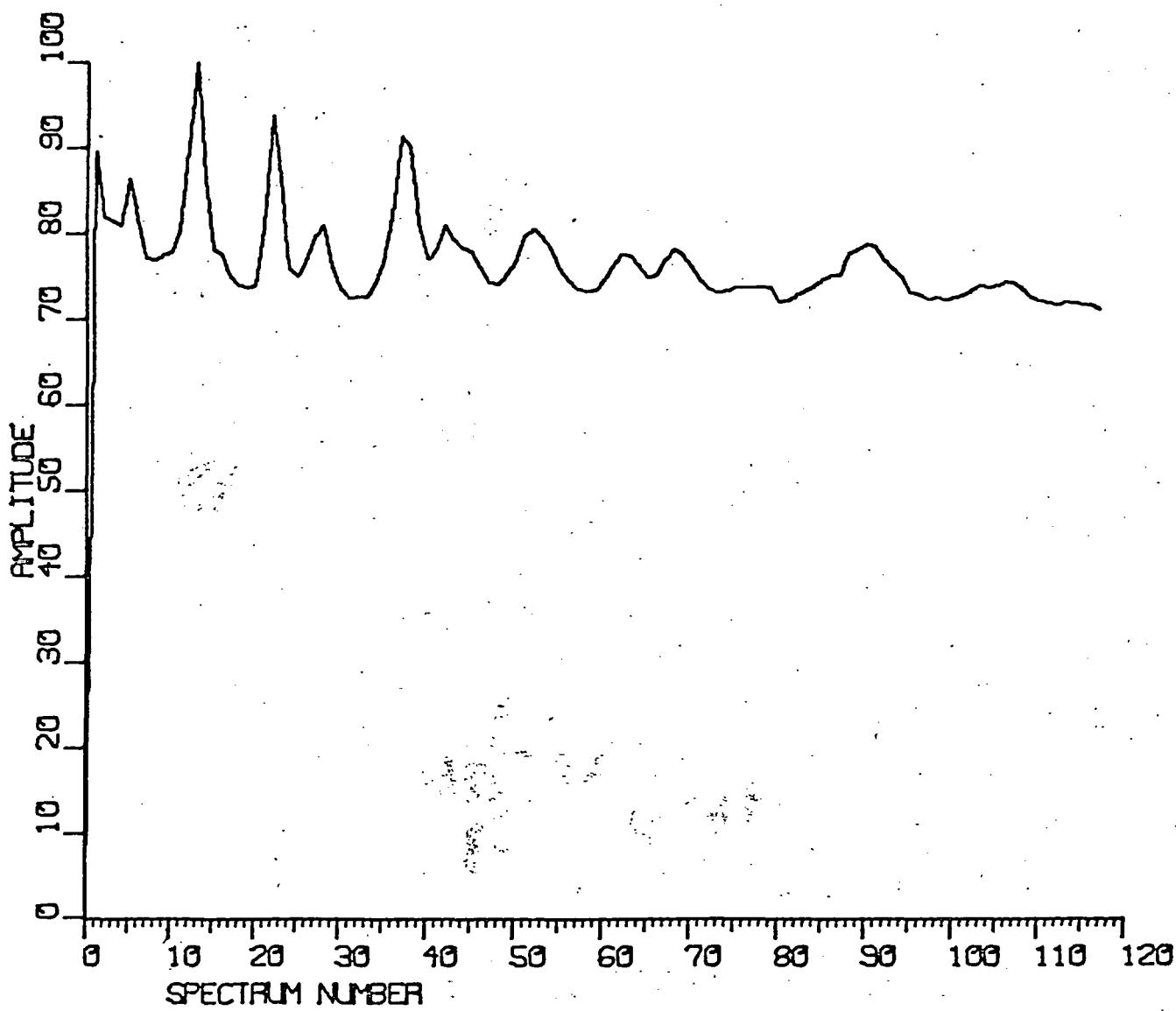


FIGURE 8

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?:  
RECONSTRUCTED GAS CHROMATOGRAM?: Y  
FILE NAME: PCB42  
LIMITED MASS RANGE?:  
PRINT?:  
EXPAND BY:

PCB 1242 STD



FIGURES 9, 10 AND 11 COMBINED

RECONSTRUCTED GAS CHROMATOGRAM

MASS RANGE: 256-261

PCB 1242 STD

45225 SED. TAKEN AT POINT OF PCB SPILL - SLIP 1 -

3100030 SLUDGE FROM PCB SPILL - SLIP 1 - ON 9-13-74

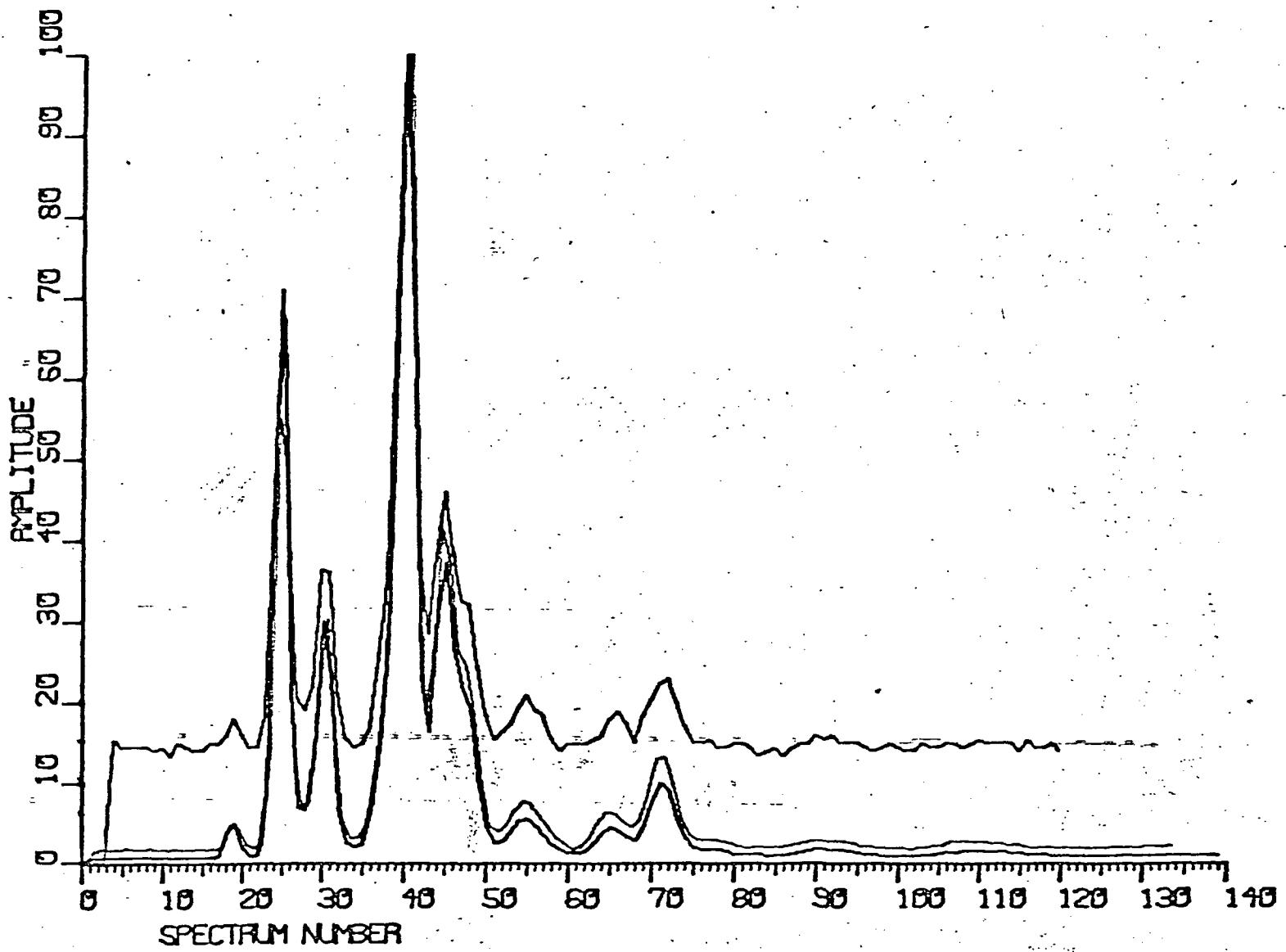


FIGURE 9

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?:  
RECONSTRUCTED GAS CHROMATOGRAM?: Y  
FILE NAME: 310930  
LIMITED MASS RANGE?: Y  
MASS RANGE: 256-261  
PRINT?:  
EXPAND BY:

310930 SLUDGE FROM PCB SPILL - SLIP 1 - ON 9-13-74

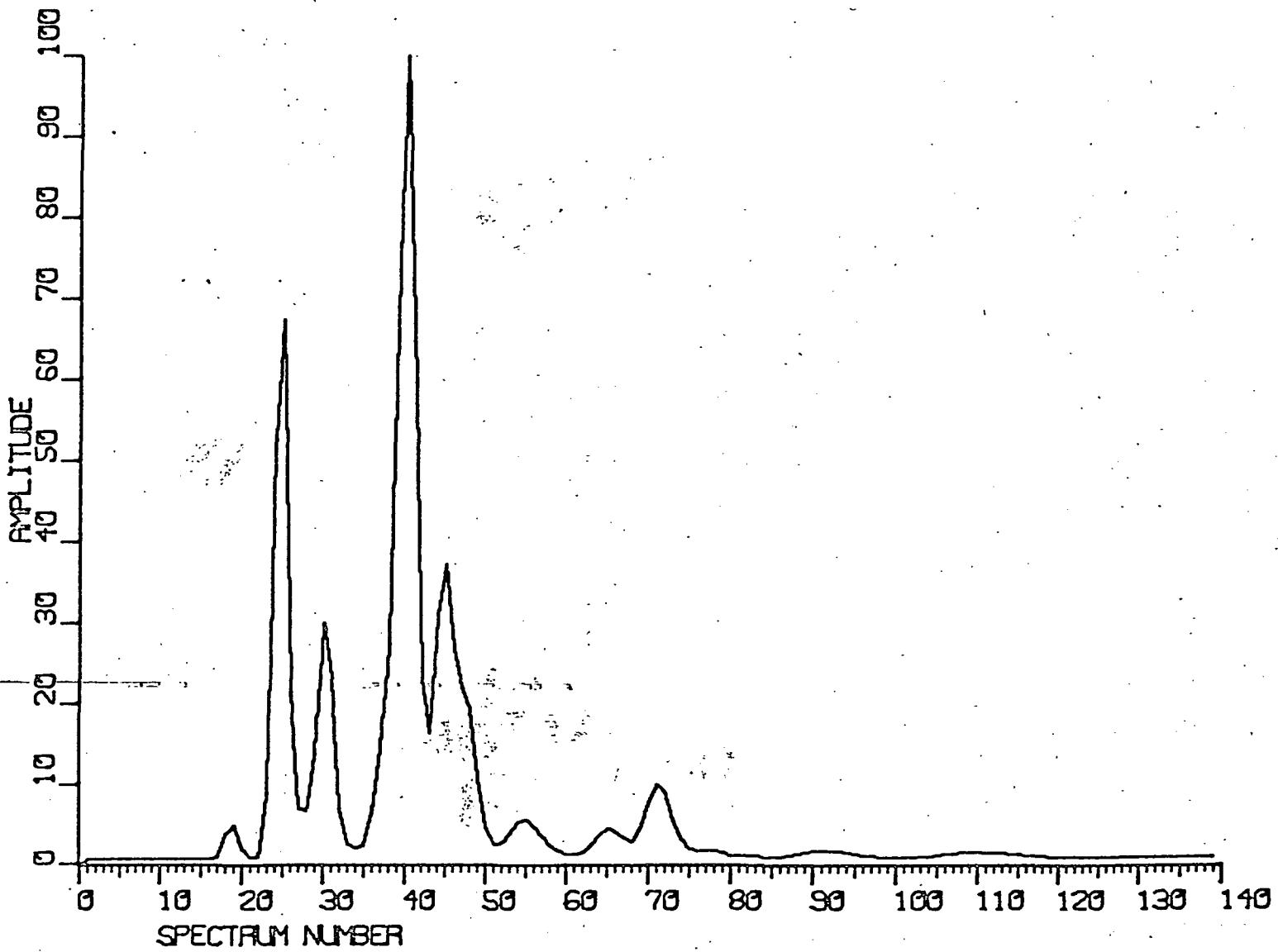


FIGURE 10

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?:  
RECONSTRUCTED GAS CHROMATOGRAM?: Y  
FILE NAME: 45225S  
LIMITED MASS RANGE?: Y  
MASS RANGE: 256-261  
PRINT?:  
EXPAND BY:

45225 SED. TAKEN AT POINT OF PCB SPILL - SLIP 1 -

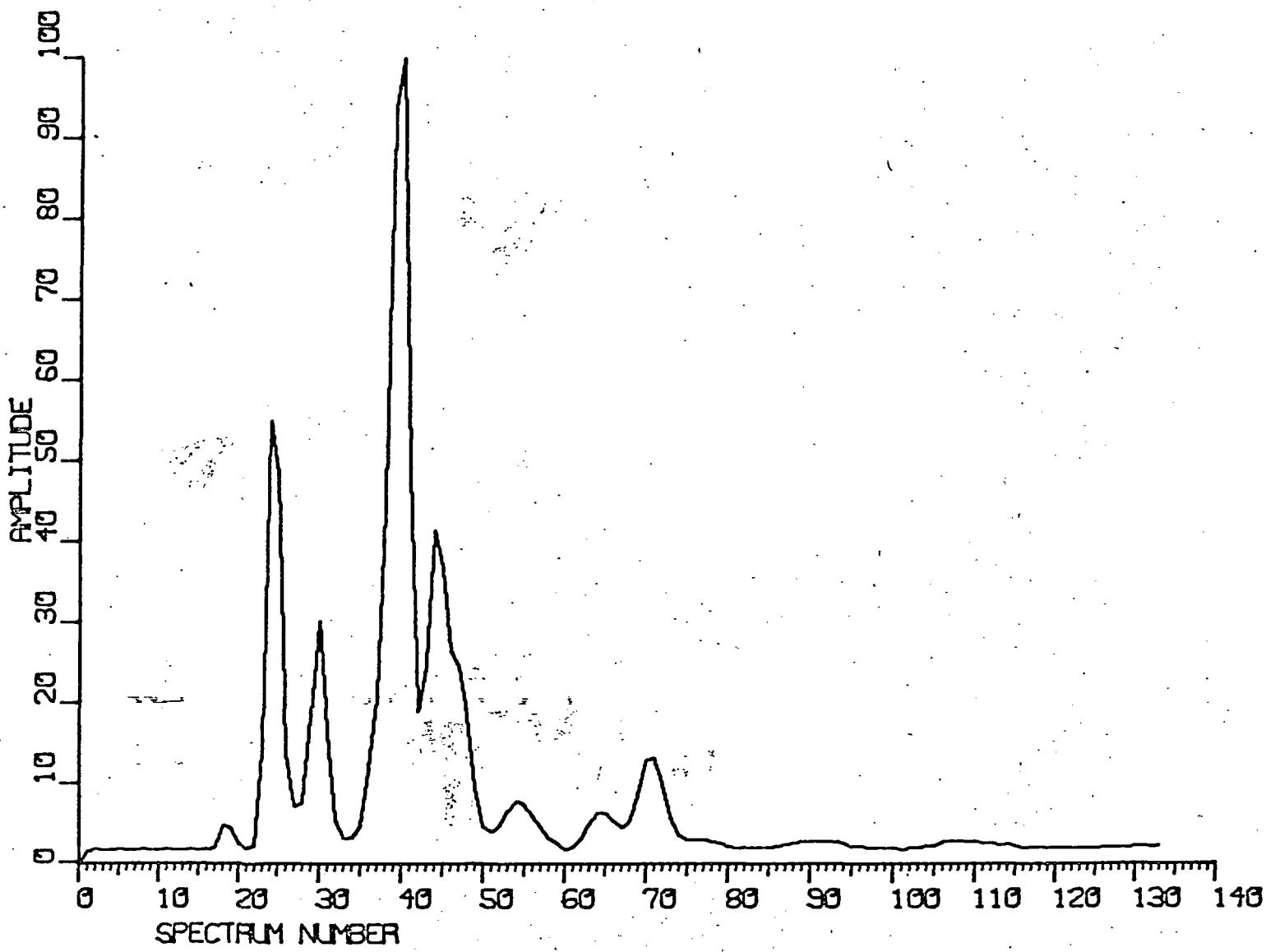
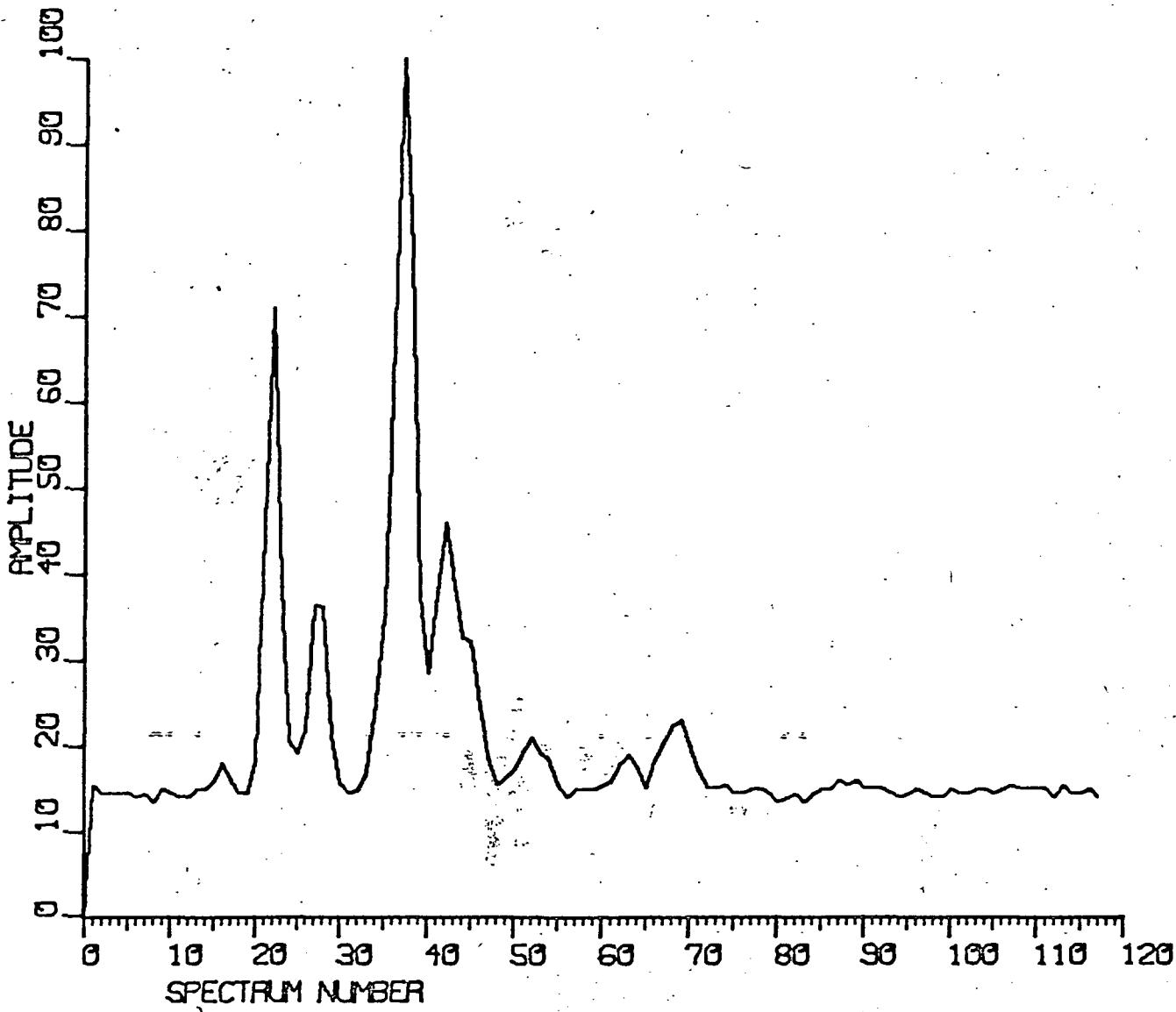


FIGURE 11

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?:  
RECONSTRUCTED GAS CHROMATOGRAM?: Y  
FILE NAME: PCB42  
LIMITED MASS RANGE?: Y  
MASS RANGE: 256-261  
PRINT?:  
EXPAND BY:

PCB 1242 STD



FIGURES 12, 13 AND 14 COMBINED

RECONSTRUCTED GAS CHROMATOGRAM

MASS RANGE: 290-300

PCB 1242 STD

45225 SED. TAKEN AT POINT OF PCB SPILL - SLIP 1 -

310930 SLUDGE FROM PCB SPILL - SLIP 1 - ON 9-13-74

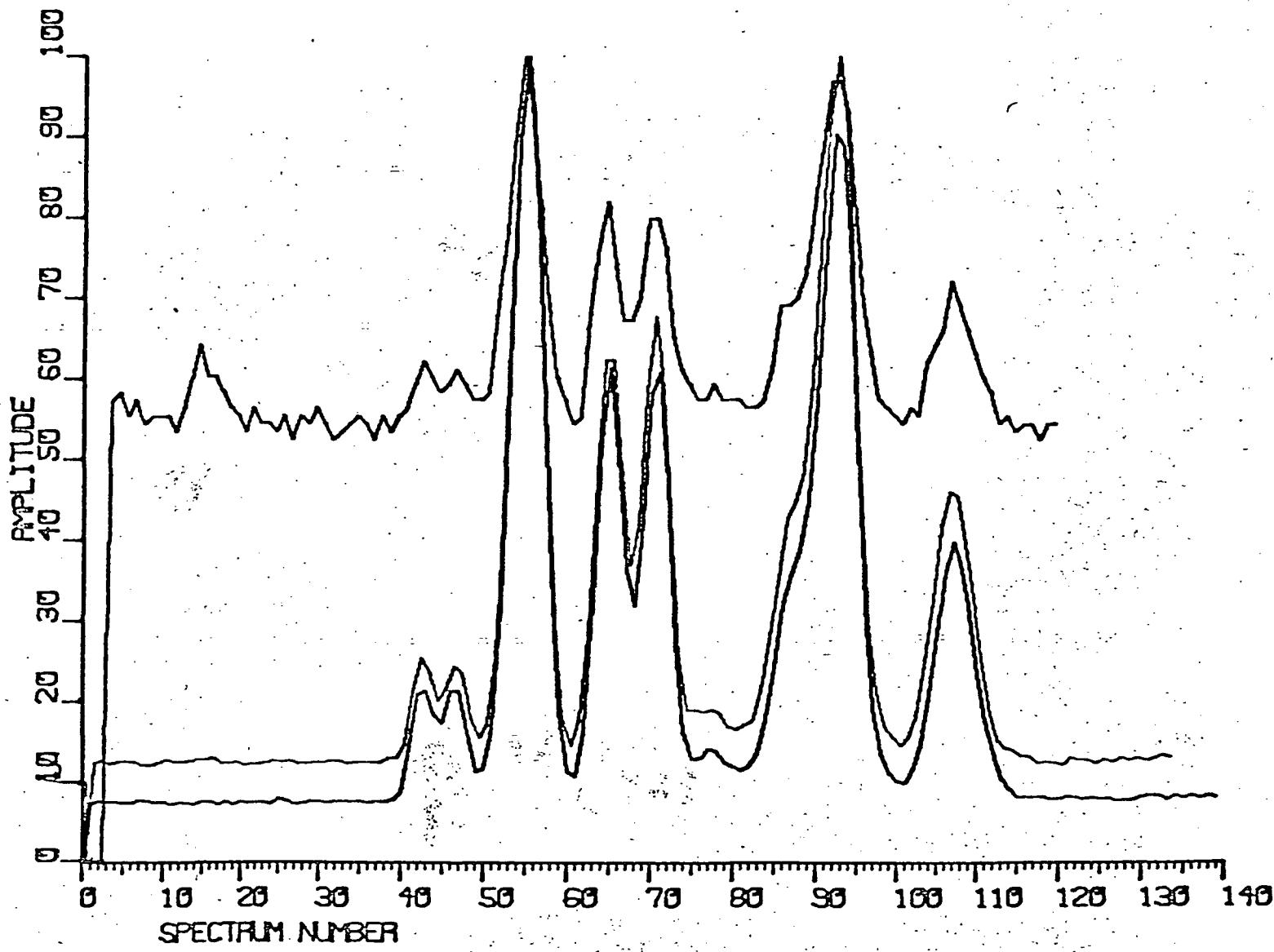


FIGURE 12

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?:  
RECONSTRUCTED GAS CHROMATOGRAM?: Y  
FILE NAME: 310930  
LIMITED MASS RANGE?: Y  
MASS RANGE: 290-300  
PRINT?:  
EXPAND BY:

310930 SLUDGE FROM PCB SPILL - SLIP 1 - ON 9-13-74

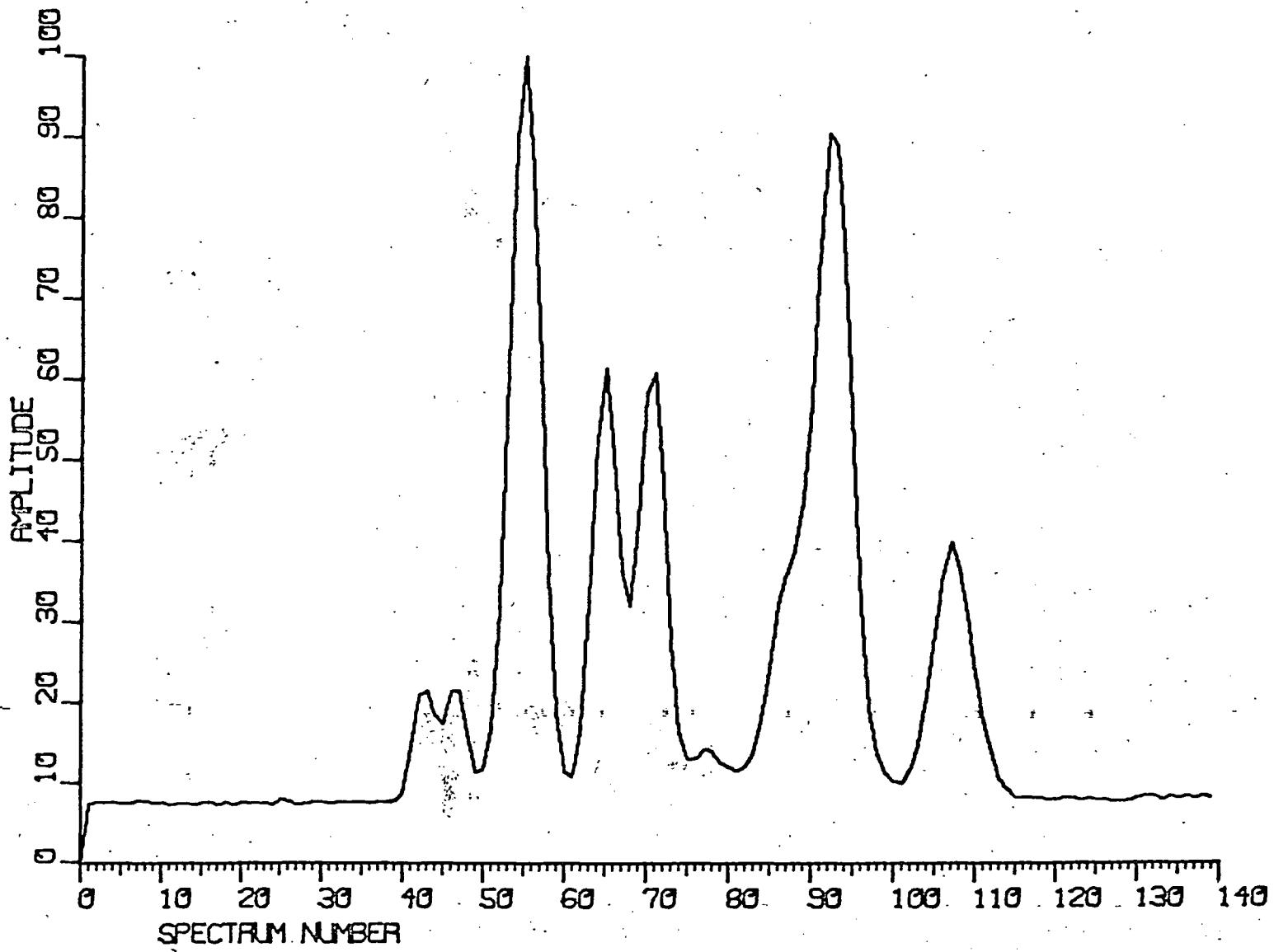


FIGURE 13

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?:  
RECONSTRUCTED GAS CHROMATOGRAM?: Y  
FILE NAME: 45225S  
LIMITED MASS RANGE: 290-300  
PRINT?:  
EXPAND BY:

45225 SED. TAKEN AT POINT OF PCB SPILL - SLIP 1 -

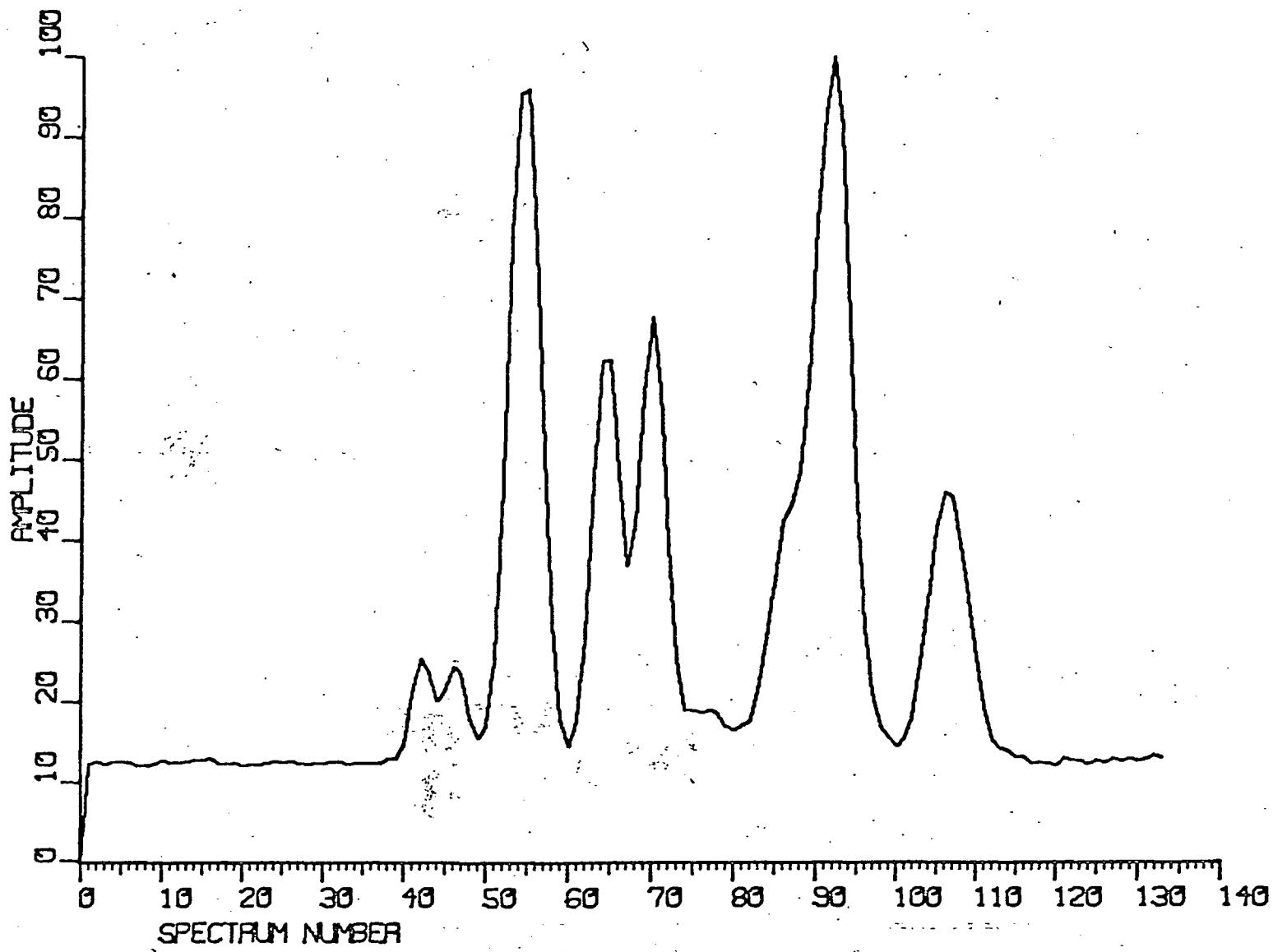


FIGURE 14

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?:  
RECONSTRUCTED GAS CHROMATOGRAM?: Y  
FILE NAME: PCB42  
LIMITED MASS RANGE?: Y  
MASS RANGE: 290-300  
PRINT?:  
EXPAND BY:

PCB 1242 STD

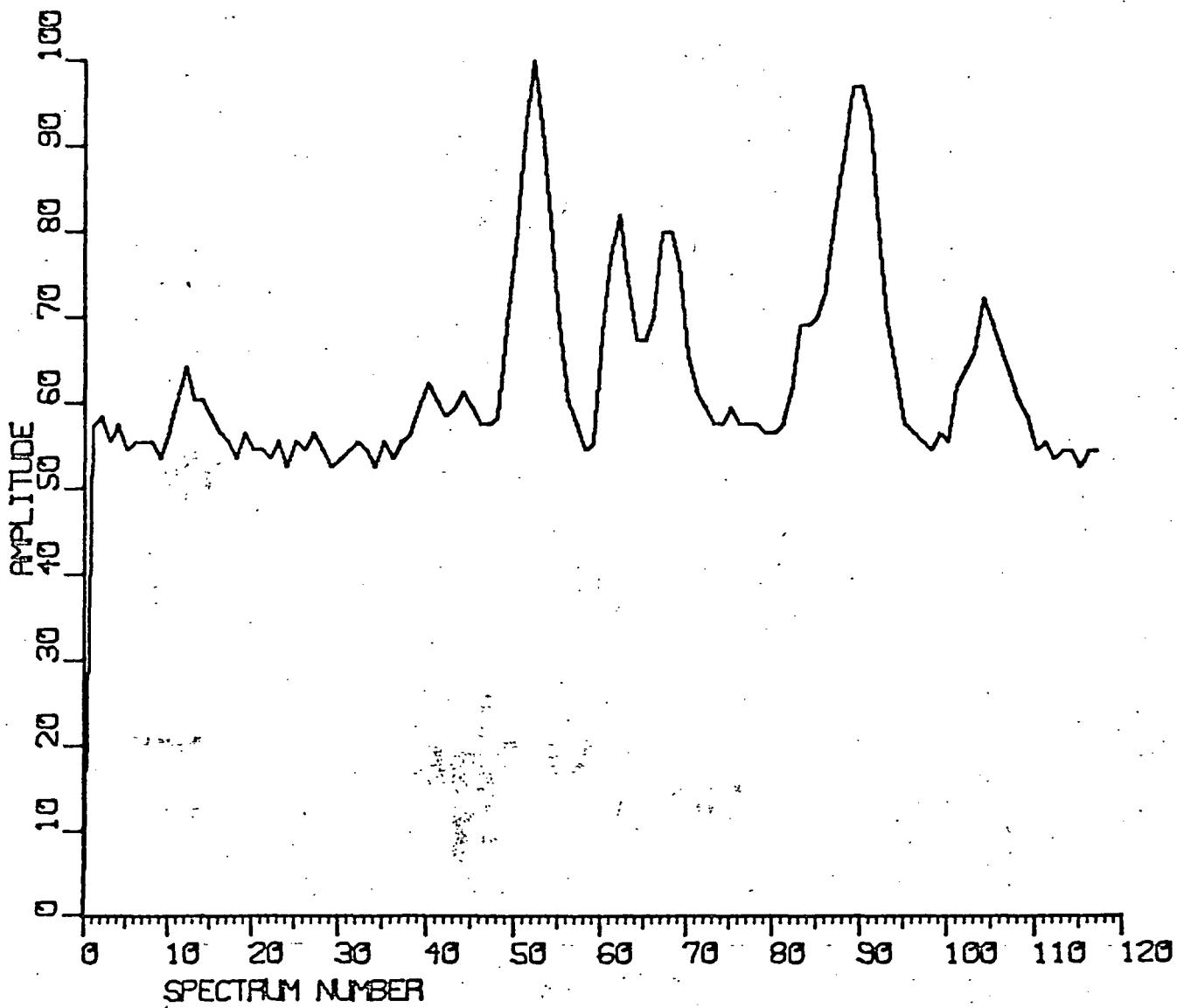
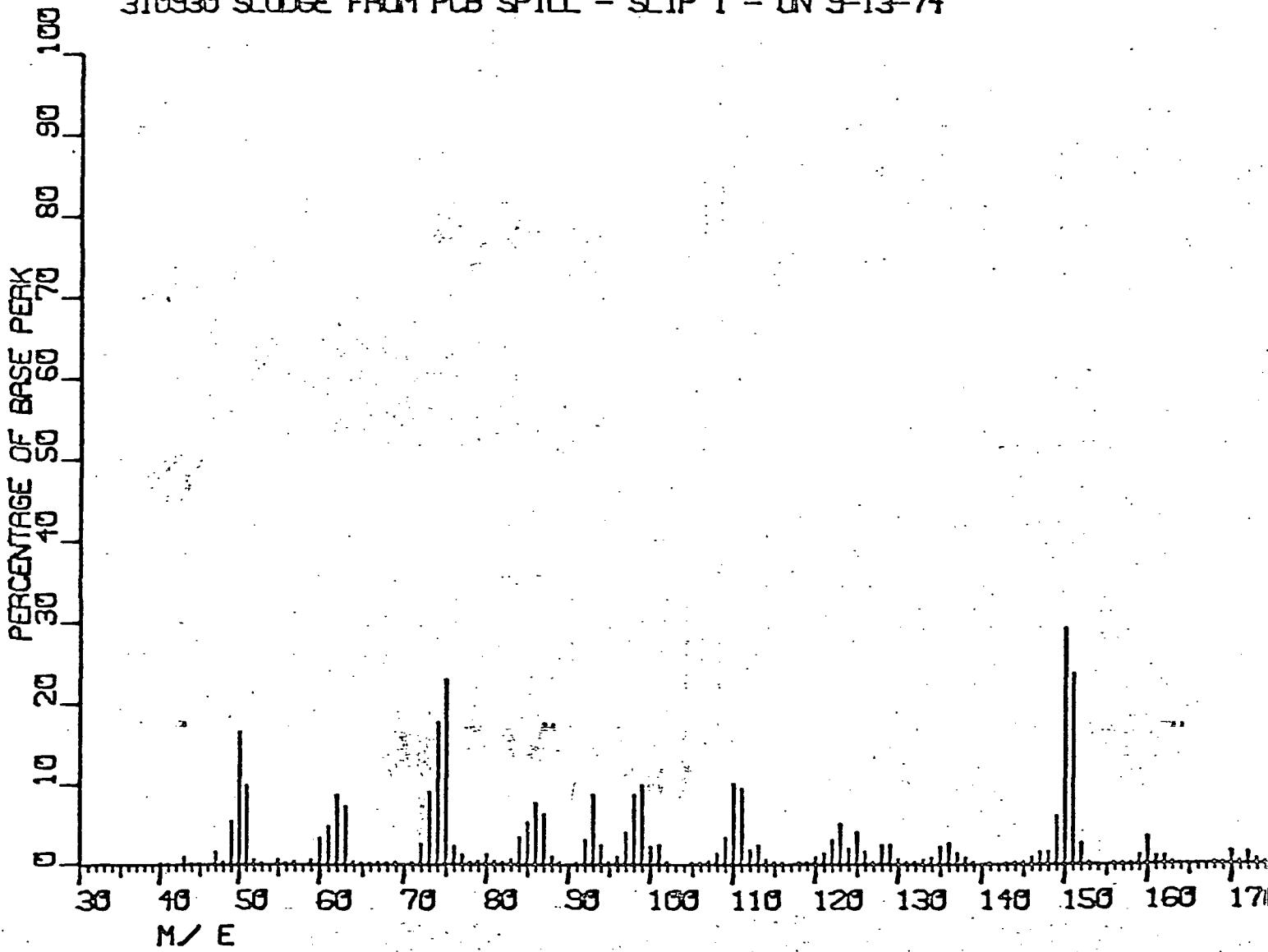


FIGURE 15

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?: Y  
FILE NAME: 310930  
SPECTRUM NUMBER: 40  
AMPLITUDE EXPANSION?:  
MINIMUM VALUE %:  
SUBTRACT BACKGROUND?: Y  
BACKGROUND FILE NAME: 310930  
SPECTRUM NUMBER: 34  
BACKGROUND AMPLIFICATION:  
SAVE SUBTRACTED FILE?  
NORMALIZE ON:

SPECTRUM NUMBER 40 - 34

310930 SLUDGE FROM PCB SPILL - SLIP 1 - ON 9-13-74



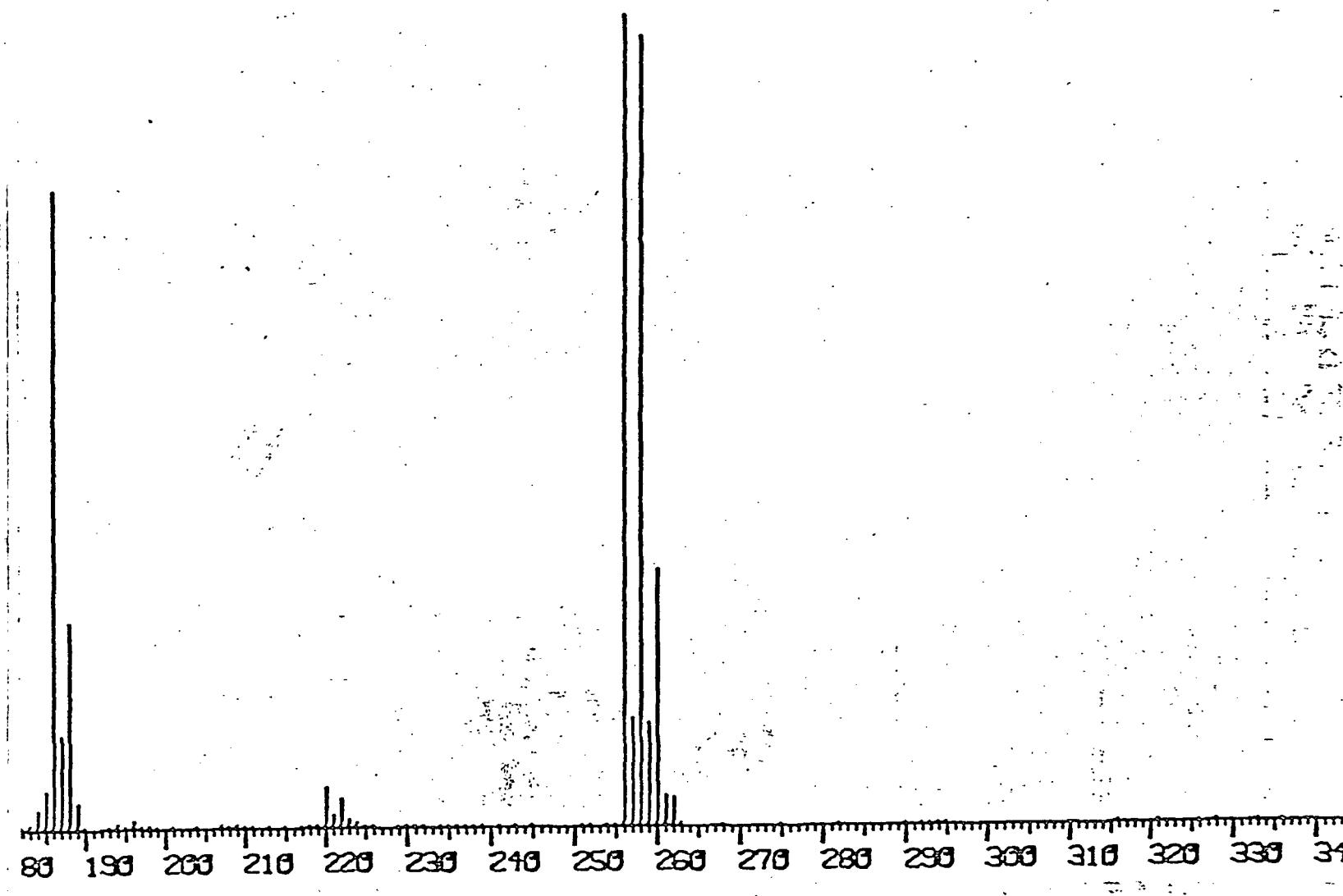
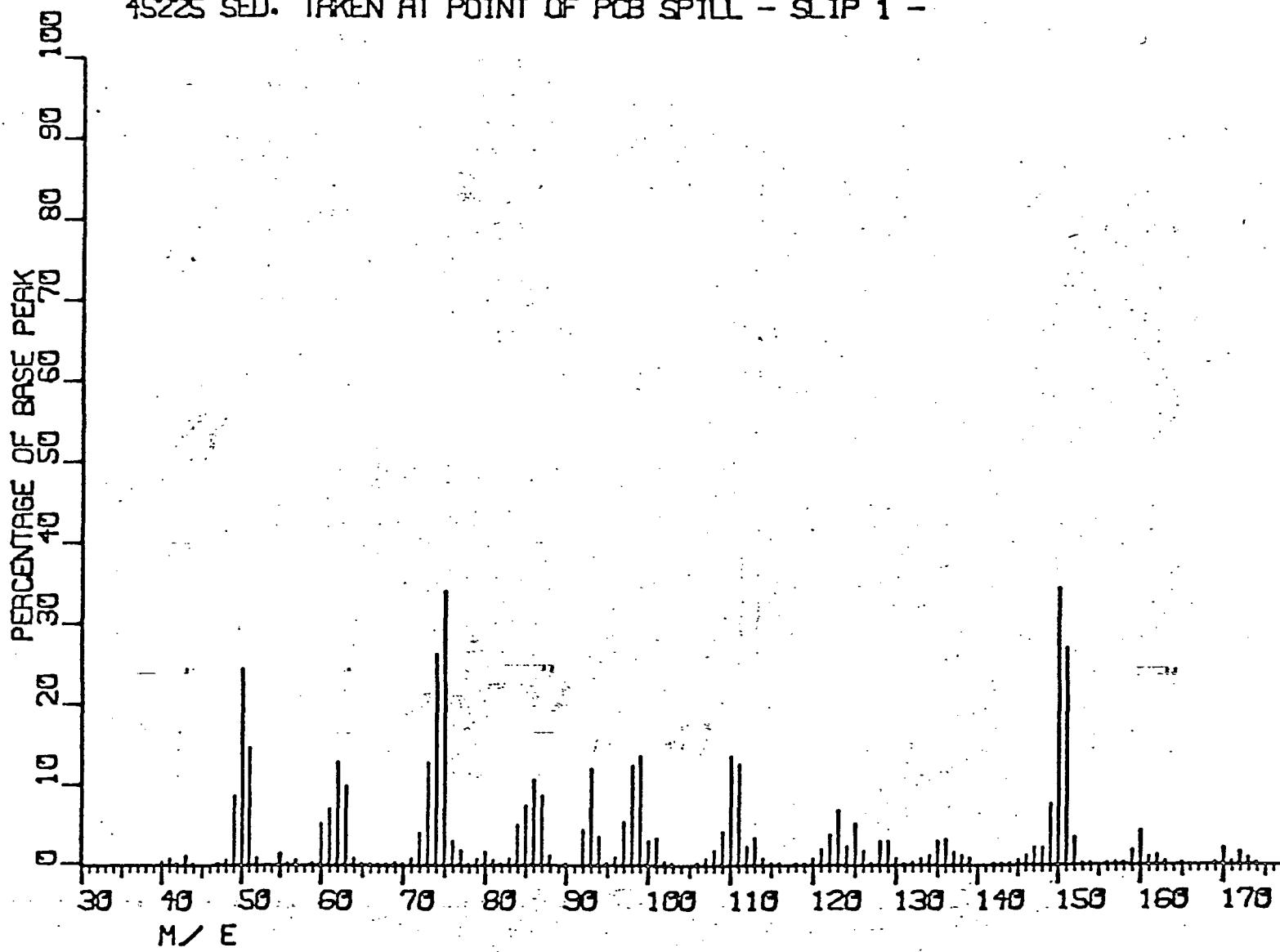


FIGURE 16

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:  
PLOT?: Y  
FILE NAME: 45225S  
SPECTRUM NUMBER: 40  
AMPLITUDE EXPANSION?:  
MINIMUM VALUE %:  
SUBTRACT BACKGROUND? P Y  
BACKGROUND FILE NAME: 45225S  
SPECTRUM NUMBER: 34  
BACKGROUND AMPLIFICATION:  
SAVE SUBTRACTED FILE?  
NORMALIZE ON:

SPECTRUM NUMBER 40 - 34

45225 SED. TAKEN AT POINT OF PCB SPILL - SLIP 1 -



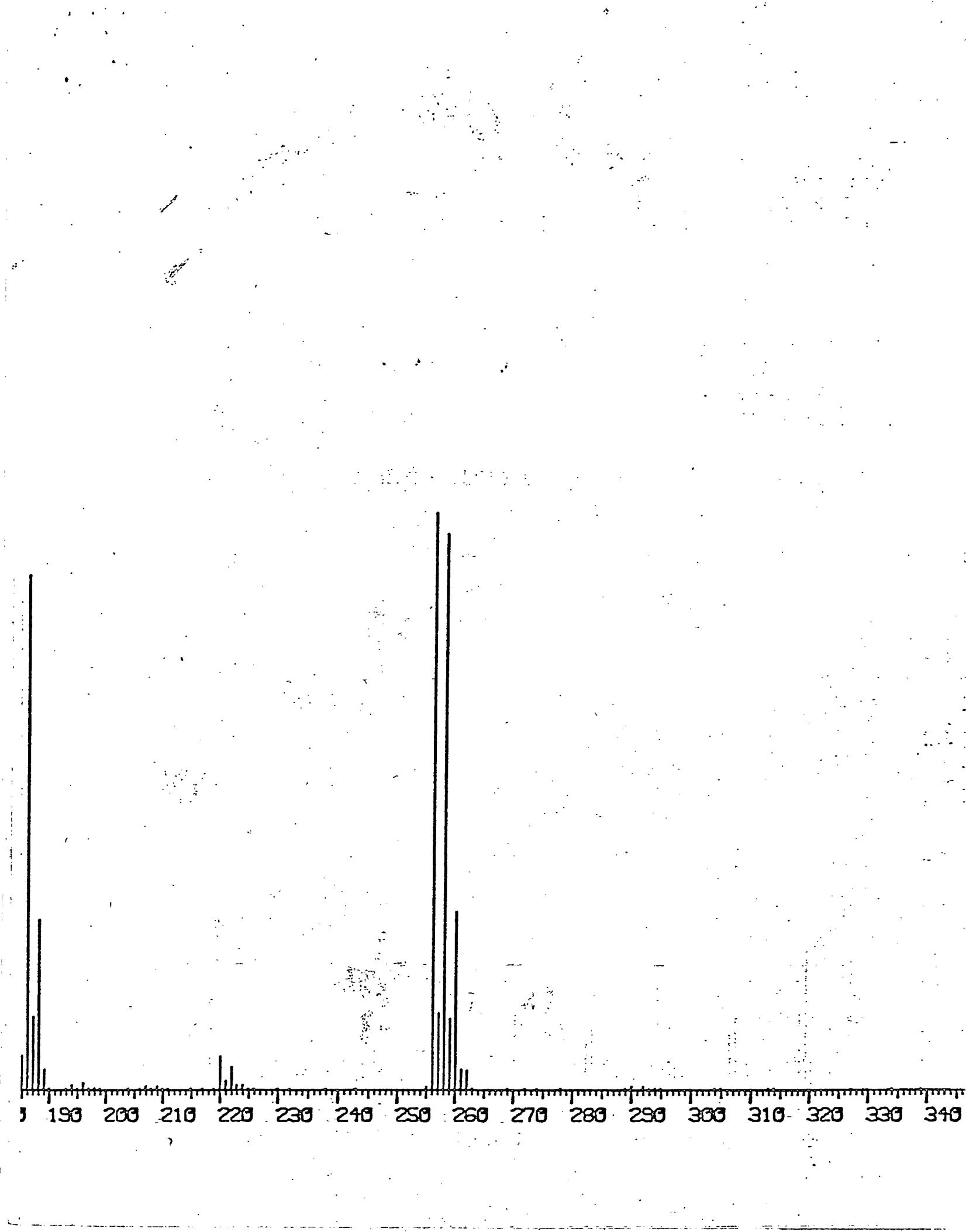


FIGURE 17

SYSTEM 150 IS ON SELECT MODE: OUTP  
PRINT?:

PLOT?: Y

FILE NAME: PCB42

SPECTRUM NUMBER: 37

AMPLITUDE EXPANSION?:

MINIMUM VALUE %:

SUBTRACT BACKGROUND?: Y

BACKGROUND FILE NAME: PCB42

SPECTRUM NUMBER: 32

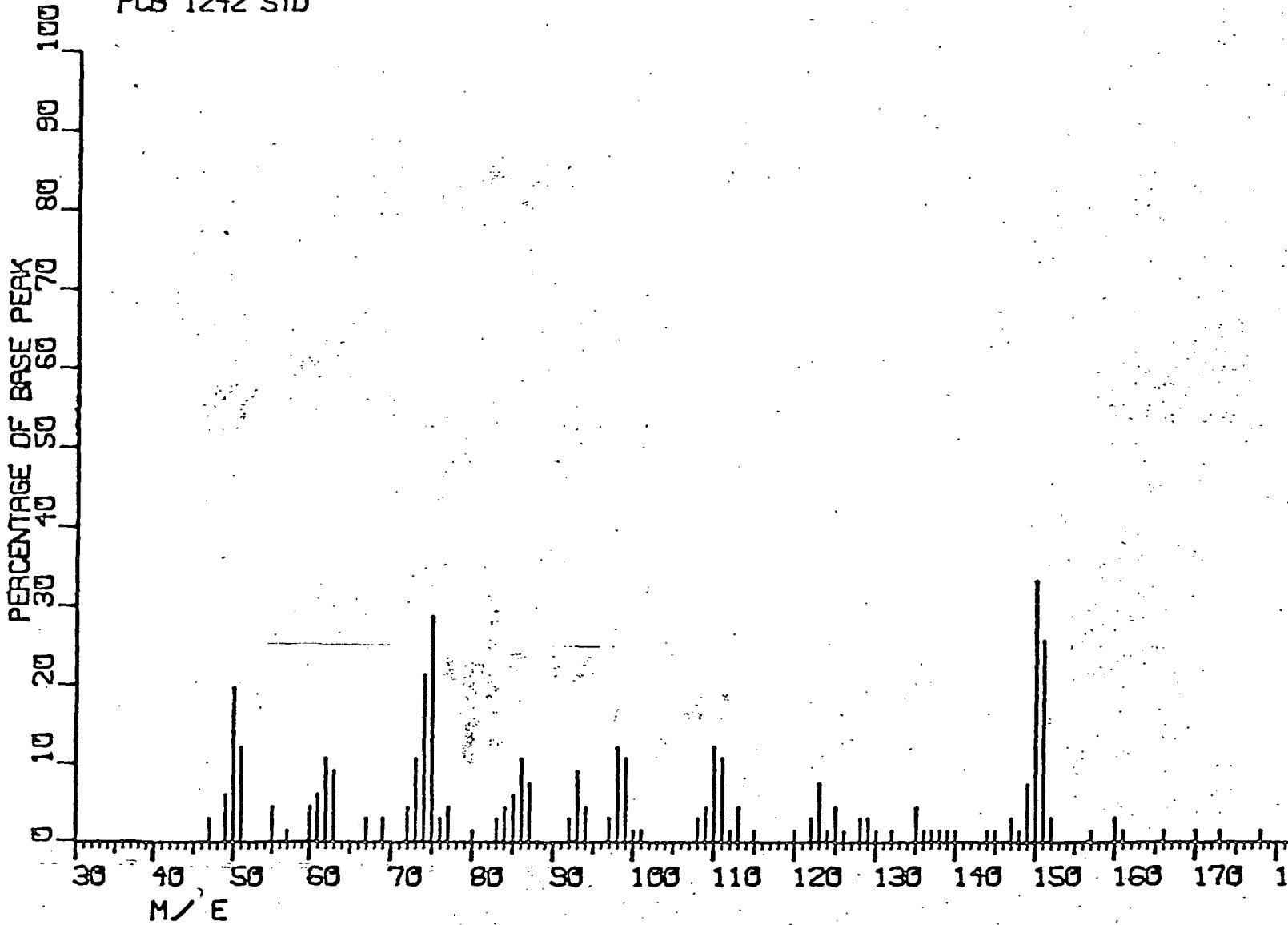
BACKGROUND AMPLIFICATION:

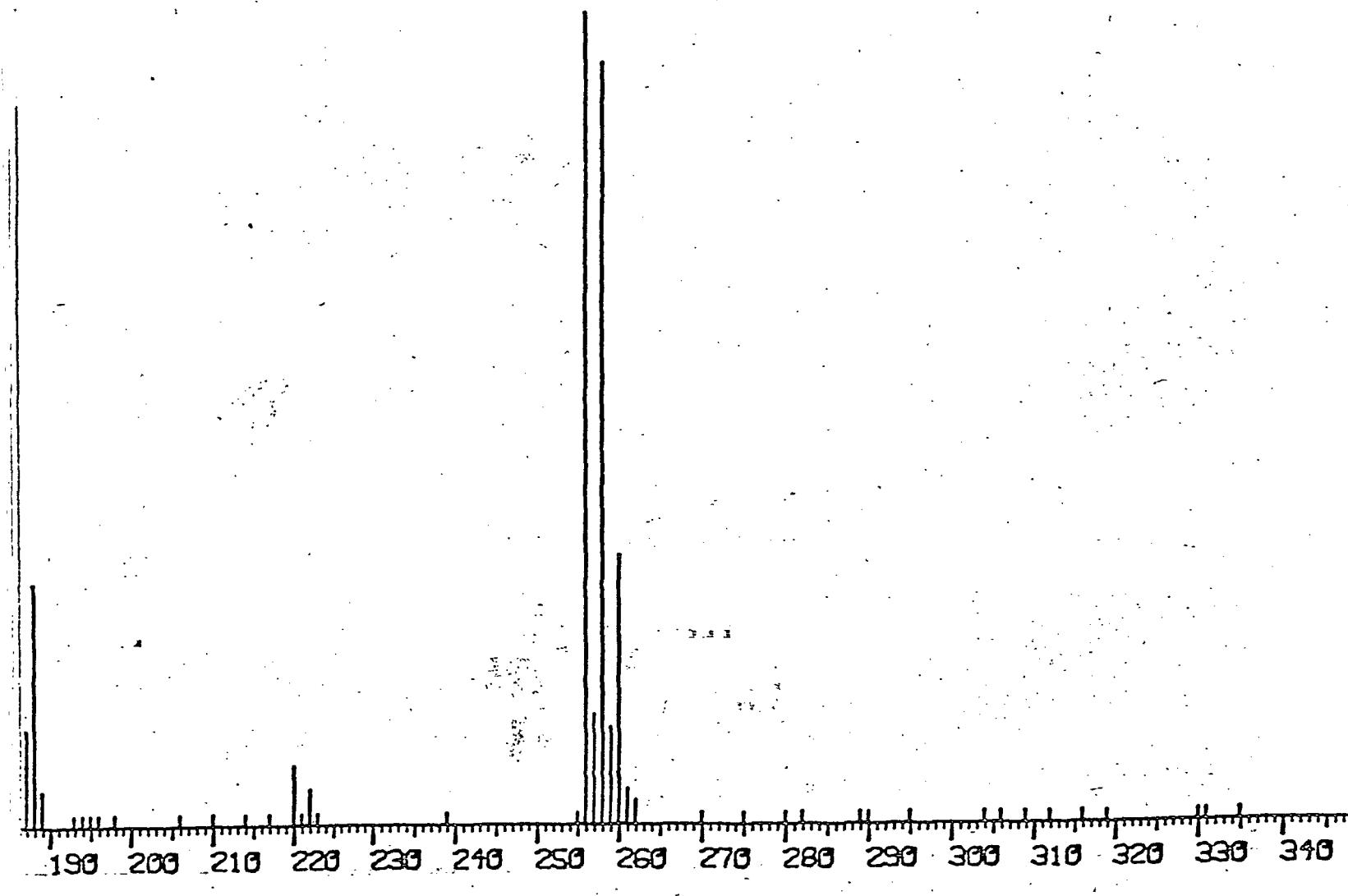
SAVE SUBTRACTED FILE?

NORMALIZE ON:

SPECTRUM NUMBER 37 - 32

PCB 1242 STD





## APPENDIX A

### Calculations

#### PCBs Remaining In Sediment

(A) For 1/3 ft deep

$$\text{STD Depth} \times \pi r^2 \text{ (factor)} = \frac{\pi L}{\text{area}} (\text{ft}^3) \times 100 \text{ lb/ft}^2 \times (\text{PCB}) = 1 \text{ lb PCB} \neq \text{gal PCB}$$

$$225 \quad 0.3 \times \pi r^2 (5.0 \times 10)^2 (0.5) = 1.17 \times 10^3 \times 10^2 \times 1.2 \times 10^{-3} = 144.0 = 12.2$$

$$231 \quad 0.3 \times \pi r^2 (5.0 \times 10)^2 (0.5) = 1.17 \times 10^3 \times 10^2 \times 13 \times 10^{-6} = 1.5 = 0.1$$

$$218 \quad 0.3 \times \pi r^2 (5.0 \times 10)^2 (1.) = 2.34 \times 10^3 \times 10^2 \times 185 \times 10^{-6} = 43.3 = 3.7$$

$$223 \quad 0.3 \times \pi r^2 (5.0 \times 10)^2 (1.) = 2.34 \times 10^3 \times 10^2 \times 12.6 \times 10^{-6} = 3.0 = 0.3$$

$$224 \quad 0.3 \times \pi r^2 (5.0 \times 10)^2 (1.) = 2.34 \times 10^3 \times 10^2 \times 50.4 \times 10^{-6} = 11.8 = 1.0$$

$$230 \quad 0.3 \times \pi r^2 (5.0 \times 10)^2 (1.) = 2.34 \times 10^3 \times 10^2 \times 18.1 \times 10^{-6} = 4.3 = \underline{0.4}$$

17.7

(B)

For 1 ft deep      18 x 3 = 55

## APPENDIX B

## Calculations

$$(A) \text{ Amount PCBs Spilled} = 250 \text{ gallon} \times \frac{8 \text{ lb H}_2\text{O}}{1 \text{ gallon}} \times \frac{1.4 \text{ lb PCB}}{1 \text{ lb H}_2\text{O}} = \underline{\underline{2800 \text{ lb}}}$$

(B) Amount PCBs in Drums

	<u>Number of Drums</u>	<u>Number lb PCB</u>	<u>Date</u>	<u>[PCB] ppth</u>
1	8	14	10-15	3.5
2	9	20	10-15	4.5
3	14	28	10-15	4.0
4	12	39	10-15&16	6.5
5	6	30	10-16	10.0
6	12	77	10-20	13
7	12	77	10-20	13
8	10	94	10-23	19
9	8	87	10-23	22
10	10	20	10-27	4
11	10	40	10-28	8
12	14	42	10-27	6
13	7	30	10-27	8.5
14	17	157	10-30	18.5
15	14	53	10-31	7.6
16	12	46	10-31	7.6
17	10	13	11-01	2.7
	185	867		

Amount Removed = 867 lb PCB in Sludge11.8 lb  
gallon  $\approx$  75 gallons